



# Food Waste Separation for Anaerobic Digestion Processing

This food waste separation guidance document is part of a series aimed at helping commercial food service providers – e.g., restaurants, hotels, corporate cafeterias, and schools – reduce the volume of organic waste disposed by their operations.

There are several options for diverting food waste – including prevention, donation, animal feed, composting, and anaerobic digestion (AD). All of these strategies are more effective when generators have systems in place for separating out organic material from waste.

Prevention should always be the top priority but the most successful diversion programs employ strategies across the EPA Food Recovery Hierarchy. This document provides specific guidance for source separating food scraps for AD. See the other tip sheets in this series for guidance on [preventing](#) and [donating](#) surplus food.

## Kitchen Separation

Recommended practices for source separation, including signage and bin placement



## Hauler Collection Frequencies

Guidance for working with your hauler including contracting, container options, pickup frequencies



## Outdoor Storage Practices

Guidelines for proper storage, from cleanliness to container maintenance

# The Basics of Anaerobic Digestion

AD is a process by which organic matter, such as animal waste or wasted food, is broken down by bacteria in the absence of oxygen. This is usually done in a sealed tank called a digester. The process both creates fertilizer from the digested waste that can be used for farming, and generates biogas composed mostly of methane. This biogas can then be combusted to generate electricity and heat, or it can be processed into renewable natural gas and transportation fuel. Figure 1, courtesy of [Quantum Biopower](#), illustrates the steps in the process.

Typical feedstocks for this process include food waste, food processing wastes, fats, oils, greases (FOG), livestock manure, industrial organic residuals, and wastewater treatment solids (known as biosolids). Some facilities process materials as a slurry and collect pulped material from facilities in tanks, while others accept solid food waste from compactors, dumpsters, or carts. Anaerobic digesters may be located on farms that process on-site waste (manure) and off-site food scraps to create energy, at municipal wastewater treatment plants that accept food waste for digestion with biosolids, or established as stand-alone sites that create energy and beneficial by-products.

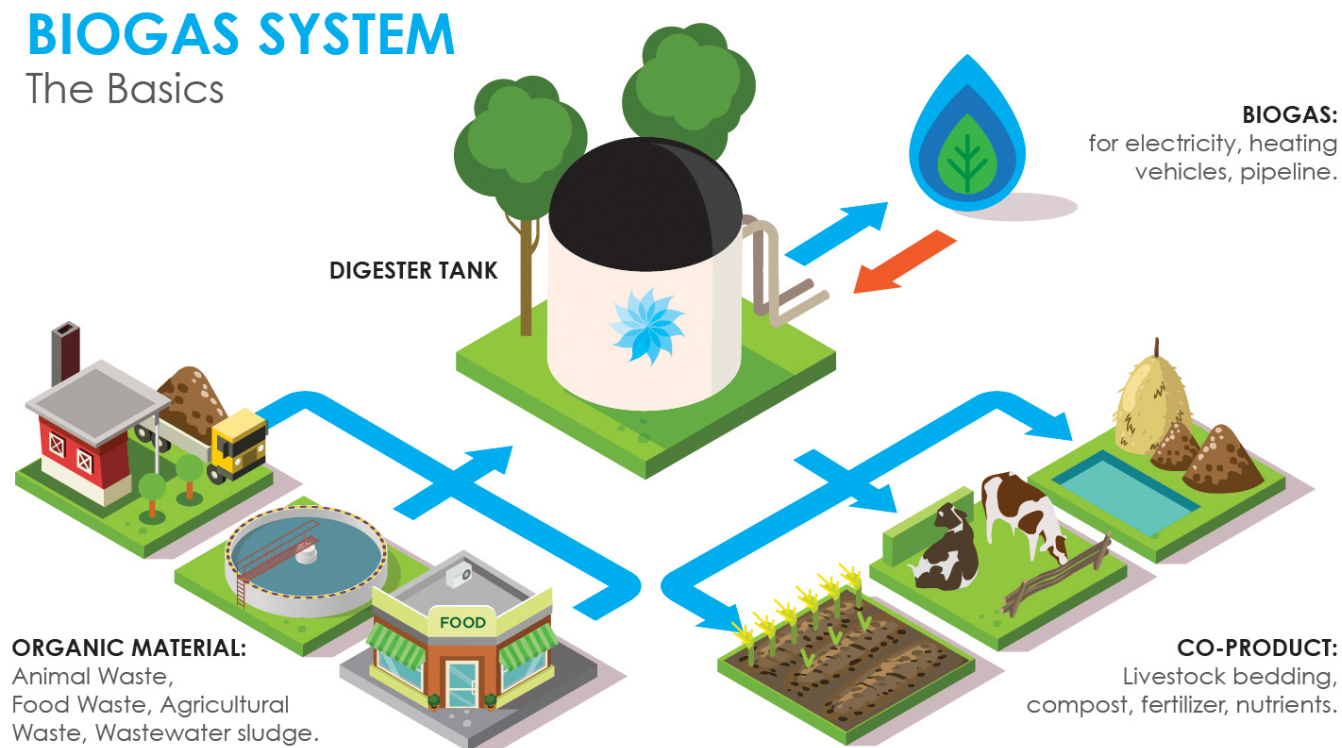


Figure 1.

# Collecting Food Waste for Anaerobic Digestion



Photo Courtesy of BioCycle Connect, LLC

**AD is usually best suited for businesses and institutions that collect food waste only.** AD occurs from the decomposition of organic components (i.e. food waste) and not compostable plastics or fiber, such as cutlery, cups, and dishes. In some cases, facilities have installed de-packaging equipment to enable acceptance of packaged out-of-date, mislabeled, damaged, or spoiled food products for processing. There are also stand-alone food waste preprocessing facilities that depackaging the food waste and haul the slurried food waste in tanker trucks to AD plants.

**Some commercial and institutional kitchens have pulpers that grind and dewater food waste to about 80% solids.**

These can be stored in wheeled carts for collection and transportation to an anaerobic digester. Another technology grinds the food waste in a garbage disposal-type unit with water, creating a slurry that is pumped to an outside storage tank. When full, the slurry is collected by a tanker truck and hauled to an anaerobic digester.

**Sites with depackaging equipment may be able to accommodate pallets or cases of materials in packaging.**

Off-spec or expired beverages or products in cans can be a good candidate for this, as well as items such as yogurt in cups. Material in glass packaging typically cannot be processed this way.

# Questions to Ask When Starting a Collection Program for Anaerobic Digestion:

**What materials can be included in collection?** Items such as compostable plastics, like service ware and plastic liners may not be accepted. Some sites may only take liquid wastes. Digesters may require the generator to have the feedstock tested to avoid accepting materials that can inhibit the AD process, e.g., concentration of ammonia, pH level.

**How does material need to be prepared for collection?** Can I place food scraps in a collection cart as-is, or do I need to pre-process this material? It is not necessary to preprocess food waste destined for AD. Many digesters are equipped to accept cleanly separated food waste with no packaging as it can be sized reduced with a grinder and added to the digester (or blended with other feedstocks like manure and then added).

**How will material be stored before it is collected?** Whole food scraps can be collected in carts, dumpsters, or compactors, whereas pulped food waste may be collected in an on-site tank.

**Do I need to invest in new equipment to support this project?** Most AD facilities that accept food waste have the equipment necessary to take food waste and do not need the generator to do the preprocessing. In some cases, commercial and institutional kitchens may already have, or decided to install, food waste pulpers that generate an acceptable feedstock for AD.

**Is there a benefit to making a longer-term commitment to divert my food waste to an anaerobic digester?** Many digesters have tipping fee tiers, with lower fees charged for longevity of a contract and volume to be supplied (the longer the contract and the greater the volume, the lower the fee). There also may be a lower fee if the food waste does not require preprocessing, e.g., an already slurried or pumpable feedstock.





## I. Kitchen Separation

Source separation of food scraps starts in kitchens and dish rooms.

Recommended back of house practices:

- Collect **kitchen food scraps** in dedicated receptacles such as bowls, buckets and barrels in the same area as trash is currently collected.
- **Containers** should be leak proof and covered when not in continuous use, or when full. They must be intended only for the purpose of food scraps collection and clearly marked.
- Remove **food scraps** from the kitchen/dish room at the same frequency as trash is removed from these areas.

Back of house practices are dependent on the volume produced and the way material is collected.

- Typically, solid food waste collection at the same frequency as trash is reasonable for most establishments; in others, food waste should be collected as often as necessary to keep the area sanitary and to prevent odor and vermin. At a minimum, collection should be every shift. Once collected, food scraps will be brought to a storage area near the trash dumpster/compactor where the hauler will pick up the material.
- Food waste that is pulped should be removed from the kitchen area at the same frequency as trash removal. At a minimum, this should be at least once a shift. Food waste that is ground with water into a slurry is typically conveyed directly into an outside storage tank.

View the following instructional video featuring Perk on Main in Middletown, Connecticut to [learn more about source separation of food scraps](#).

## II. Hauler Collection & Frequencies

As a rule, food scraps should be collected by the haulers at a frequency that minimizes odor, insects, vectors and other pests. Many businesses and institutions found their waste management programs cleaner and more efficient after adopting a program to source separate food waste. In some cases, variations on the recommended practices below should be agreed upon between the health department, food establishment and hauler.

Haulers typically provide exterior collection containers in the form of carts, dumpsters, or compactors, depending on their truck capabilities, existing routes, and your specific needs.

## Dumpsters and Carts:

Typical sizes used for food scraps collection include 32, 48, or 64-gallon wheeled carts and dumpsters of 2, 4, 6, and 8 yard sizes.

- In summer (April-September) it is recommended that food scraps collected in wheeled carts or dumpsters be hauled away for processing twice per week.
- In winter (October-March) it is recommended that food scraps collected in wheeled carts or dumpsters be hauled away for processing once per week.

Certain situations may dictate the need for more frequent removal, such as proximity of the collection container to other establishments and the type of food waste generated. Most establishments will be fine with a 2x/week collection, while generators such as seafood restaurants may need to collect more frequently.

## Compactors:

Usually 20 yards or more, compactors are used by large food waste generators that also have the space to site a container of this size at their facility. A self-contained compactor typically has a chute with a door leading from a loading dock or from the inside of a building to feed it and has no area open to the air.

- It is recommended that food waste collected in compactors be hauled away for processing once per week, year-round.

Location of the compactor relative to sun exposure may affect hauling need frequency. The condition of the compactor should be checked regularly for leaks or rusting. If the compactor has an open chute leading directly from the inside of the building, odors may create problems inside the establishment. Compactors should be emptied as often as necessary to keep the area clean, sanitary and free of odors and insects. Extending the time frequency of pick up should be agreed upon by the establishment, hauler and health department.

Slurried food waste is stored in a holding tank. To maintain cost efficiencies, tanks should be pumped as close to full as possible. Some systems will measure the volume of material in a tank and may even offer automated service that involves flagging the need for collection. In other cases, a staff member may need to monitor tank levels and call for service when tank is close to full.



Photo Courtesy of BioCycle Connect, LLC

### III. Outdoor Storage Practices

Type and location of containers will vary. There is also considerable variability in local trash area requirements and space availability, especially between dense urban centers and less dense or space constrained areas.

- **Storage:** Outdoor storage surfaces should be nonabsorbent (concrete or asphalt), smooth, and durable and sloped to drain. Some communities require trash/recycling areas to be fenced in or otherwise out of view. It is best for businesses/institutions to check with the local health department to determine if this is required. The storage area must be maintained in good repair, clearly marked with no-parking signs, easily cleanable and if necessary/possible, enclosed by fencing to contain windblown litter. The area should be free of food debris, residue, and unnecessary clutter.
- **Container Maintenance:** Dumpsters, carts or compactors should be closable and cleanable, leak-free, water tight and capable of being locked. Discuss with your hauler and AD facility if plastic or wet strength paper bags may be used to line closed receptacles. Tanks should be fully enclosed, and in colder climates may need to be insulated or kept indoors to avoid freezing. All doors/hatches/tight-fitting lids should be closed or in place when not in immediate use to prevent pests from entering the container.
- **Cleanliness:** Carts, dumpsters, compactors, tanks, and other bins should be cleaned often enough to prevent odor and other pest/vector attractions. High pressure pumps, hot water, steam and detergent are cleaning materials that should be used as necessary. Discuss the best location for washing with your hauler and management to ensure any residuals are properly contained.
- **Locks** on outside containers in areas of high foot traffic should be considered to prevent passersby from adding trash into carts containing source separated food scraps.



# Signage

- All **receptacles should be clearly labeled** for their intended purposes - i.e. food scraps, recycling, trash.
- Signs should be **picture-based with minimal words** and should include pictures of what can and cannot be put in the receptacle. Text on the signs should be in multiple languages. Haulers may be able to provide signage.
  - Ideally, pictures should be tailored for the generator, showing examples of waste that is actually generated at the site.

# Training

- **Train all staff** in new sorting and waste separation practices, and incorporate training into onboarding processes for new employees.
- **Monitor contamination levels** - or ask haulers to do so - and use instances of contamination to remind staff about separation guidelines.
- **Provide periodic “refreshers”** on source separation and waste management guidelines and goals. Consider appointing staff members to be in charge of monitoring and training peers.





# Anaerobic Digestion Facility FAQs

## **Is diverting food waste to AD that much different than diverting it to a composting facility?**

Yes, primarily due to the biology in a compost pile versus an anaerobic digester. With composting, food waste is mixed with carbon in the form of ground yard trimmings and/or wood chips. That creates a dilution effect that mitigates the impact from a food waste that may be offensive to the microbes. The microbial community in a digester is more sensitive to being overfed (i.e., a high loading rate of organic material) and to factors like high ammonia that inhibit the digestion process and are toxic to the microbes. To avoid these types of upsets, most digesters that receive a variety of food waste streams have a receiving tank where incoming feedstocks are blended and hydrolyzed to create a more homogenous feed going into the digester.

## **Are there materials handling considerations that may be unique to AD? How do they differ depending on the material type?**

Liquid streams (e.g., food processing slurries and beverage wastes) offload from the tanker truck directly into a receiving tank. Solid streams may be unloaded onto a tipping floor, where contamination that can damage preprocessing equipment and pumps is removed. Remaining material is fed into a hopper or onto a conveyor, which feeds the preprocessing equipment, e.g., the depackager. A few facilities have equipment ahead of the depackager, e.g., a feed hopper equipped with augers that break open bags and size reduce feedstocks, which improves materials separation during depackaging. One facility's pretreatment step includes crushers, screens, and magnets ahead of depackaging.

## **What can food waste generators do to work most efficiently and effectively with anaerobic digesters?**

Separation of contamination at the source is very beneficial, even if an AD facility has equipment to remove it. Contamination in a digester is just as problematic as contamination at a composting facility, and for both, getting it out is a challenge. Heavy contaminants sink to the bottom of the digester, and have to be removed over time, which requires emptying the digester tank. Although screens on depackagers remove larger pieces of contamination, smaller particles may pass through the screens and into the slurries. Some facilities utilize a secondary screen prior to AD to remove smaller particles, and others will screen the digestate to try to remove contaminants.

## **Can digesters take a wide variety of food waste types?**

Yes. Currently most digesters that accept food waste take materials from the commercial and institutional sectors, as well as from industrial sources, such as food and beverage manufacturers and meat processing facilities. A number of digesters accept fats, oils and grease as those feedstocks have high biomethane potential, i.e., they are high strength organics that generate significant amounts of biogas. To avoid digester upsets, facilities typically test feedstocks (or ask the generator to have them tested at a lab) to ensure they are suitable for their process.



The Center for EcoTechnology (CET) helps people and businesses save energy and reduce waste. CET acts as a catalyst to accelerate the development of a vibrant marketplace to divert wasted food from the commercial and institutional sectors. We have been a leader in the wasted food reduction and diversion movement for more than 20 years, implementing some of the first wasted food composting programs in the country, and contributing to effective public policy.

We believe that better managing wasted food is critical in order to address climate change, feed more hungry people, and grow our economy. If you are a business, institution, city, state or federal agency, industry group or foundation, and want to tackle the issue of wasted food, please contact us!

Phone: (888) 813-8552 | Email: [wastedfood@cetonline.org](mailto:wastedfood@cetonline.org)  
[wastedfood.cetonline.org](http://wastedfood.cetonline.org)

The Center for EcoTechnology (CET) developed this original document under contract to MassDEP as part of MassDEP's RecyclingWorks program. This was developed in collaboration with health officials, haulers, anaerobic digestion facilities, and organizations with established source separation programs. This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement 00A00553 to the Center for EcoTechnology. The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency, nor does the EPA endorse trade names or recommend the use of commercial products mentioned in this document.