

The State of New Jersey School Food Waste Guidelines



Higher Education Edition

November 2019

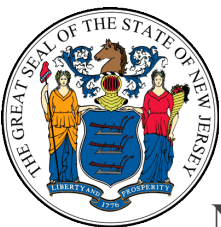
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Executive Summary



Executive Summary

In accordance with P.L.2017, c.210 approved August 2017, the New Jersey Department of Environmental Protection in consultation with the New Jersey Department of Agriculture, the New Jersey Department of Education, the New Jersey Department of Health, and the New Jersey Office of the Secretary of Higher Education developed voluntary guidelines for K-12 schools and higher education institutions to reduce, recover, and recycle food waste. State agencies hosted a meeting to review draft guidelines and solicit input, the following nonprofit organizations attended:

- Association of New Jersey Environmental Commissions (ANJEC)
- Association of New Jersey Recyclers (ANJR)
- Bridgeton Public Schools
- City of East Orange Department of Recreation & Cultural Affairs
- New Jersey Principals and Supervisors Association
- New Jersey School Boards Association (NJSBA)
- New Jersey School Buildings and Grounds Association
- New Jersey School Nutrition Association
- Rutgers Cooperative Extension
- Rutgers EcoComplex
- Sustainable Jersey
- Sustainable Jersey for Schools
- Table to table

P.L.2017, c.210 requires that School Food Waste Guidelines to include:

1. Information on food waste generally and the benefits of reducing, recovering, and recycling food waste.
2. Recommendations for how schools can incorporate this information into their curricula and create programs and activities for the reduction, recovery, and recycling of food waste.
3. Recommendations for how schools can reduce the volume of surplus food they generate.
4. Guidance on how schools can create share tables in their cafeterias.
5. Information on cost-effective, safe, and sanitary means by which schools may donate excess, unused, and edible food to nonprofit organizations that distribute food to nearby individuals.

Introduction to the School Food Waste Guidelines

While the Environmental Protection Agency (EPA) defines food waste as “any food that is fit for human consumption that is sent for disposal” (EPA 2018), the guidelines also address non-consumable food waste, such as spoiled food and inedible trimmings. Food waste can consist of unsold food from retail stores, untouched prepared food or trimmings from restaurants, grocery stores, cafeterias or industrial processing facilities (EPA 2018). Environmental benefits associated with food waste reduction, recovery and recycling include resource conservation, energy savings, greenhouse gas avoidance, landfill space savings, and cost savings for schools.

These School Food Waste Guidelines are meant to advise K-12 schools and higher education institutions on how they can effectively reduce, recover, and recycle food waste. The guidelines use the EPA Food Recovery Hierarchy to illustrate how to prioritize actions schools can take to prevent and divert wasted food.

The EPA Food Recovery Hierarchy

The EPA Food Recovery Hierarchy prioritizes food waste actions from the most preferred way at the top to the least preferred way at the bottom. These include the following:

- Source Reduction (Reduction sections)
- Feed Hungry People (Recovery sections)
- Feed Animals (Recycling sections)
- Industrial Uses (Recycling sections)
- Composting (Recycling sections)
- Landfill



Figure 1: EPA Food Waste Hierarchy. The Food Waste Hierarchy prioritizes actions schools can take towards reducing, recovering and recycling food waste. Learn more at the [EPA's Food Recovery Hierarchy web page](http://www.epa.gov/sustainable-management-food/food-recovery-hierarchy), www.epa.gov/sustainable-management-food/food-recovery-hierarchy.

Sections within the School Food Waste Guidelines

The food waste guidelines are organized into two separate documents. The first provides guidance to K-12 schools and the second to higher education institutions.

Table 1: Guidelines by Section. Sections included in the K-12 and higher education editions of the School Food Waste Guidelines.

<i>Section in Guidelines</i>	K to 12 Guidelines	Higher Education Guidelines
Executive Summary	✓	✓
Getting Started	✓	✓
Getting Started Case Study	✓	-
Reduction	✓	✓
Reduction – Case Study	✓	✓
Recovery	✓	✓
Recovery – Case Study	✓	✓
Recycling	✓	✓
Recycling – Case Study	✓	✓

Getting Started Sections

The guidelines begin by offering suggestions on how K-12 schools and higher education institutions can begin to address food waste. Guidance is provided on the following preliminary steps that facilitate the scope of the program and identifies the best person or group of people to develop the program.

The K-12 guidelines for starting food waste programs on campus offer guidance on how to:

- Designate a faculty leader, and create a club, group, or committee
- Measure food waste
- Collect food waste

And include one collection case study:

- Collection Case Study - John Witherspoon Middle School

The higher education guidelines for starting food waste programs on campus offer guidance on how to:

- Designate a faculty leader, and create a club, group, or committee

- Measure food waste
- Collect food waste

Reduction Sections

Reduction is the most important action for preventing food waste and is at the very top of the Food Recovery Hierarchy. Reducing food waste prevents the need to deal with excess or spoiled food by not producing the food in the first place.

The K-12 edition's reduction section offers guidance on the following food waste reduction practices, and one reduction case study:

- Smart Food Handling Techniques
- The Smarter Lunchrooms Movement
- Production Records
- Scheduling Considerations
- Reduction Case Study – Paterson Public Schools

The higher education edition's reduction section offers guidance on the following food waste reduction practices, and one reduction case study:

- Connecting with a School Food Recovery Network
- Implementing a Food Recovery Program – Includes guidance from the NJ Department of Health
- Share Tables
- Recovery Case Study – Table to Table

Recovery Sections

Only about 3 to 10 percent of unsaleable food from manufacturers, retailers, restaurants, and food service providers is recovered and donated each year (NRDC 2017). Food recovery is the process of preventing edible food from being wasted at restaurants, grocery stores, markets, or dining facilities by donating excess to food banks, food pantries, or soup kitchens under certain legal requirements. Many schools have initiated food waste recovery actions by donating whole, unused, and unopened food items where they are needed.

The K-12 edition's recovery section offers guidance on the following food waste recovery practices, and one recovery case study:

- Connecting with a School Food Recovery Network
- Implementing a Food Recovery Program – Guidance from the New Jersey Department of Health
- Recovery Case Study – Table to Table

The higher education edition's recovery section offers guidance on the following food waste reduction practices and one recovery case study:

- Connecting with a School Food Recovery Network

- Implementing a Food Recovery Program – Includes guidance from the New Jersey Department of Health
- Share Tables
- Recovery Case Study – Table to Table

Recycling Sections

It is estimated that a single student can generate over two pounds of compostable materials, such as food scraps and soiled paper, each day (NERC 2010). That means a large amount of compostable materials will unnecessarily be sent to landfills if not diverted and recycled. Recycling school food waste significantly reduces a school’s municipal solid waste stream and creates an avenue for the waste to be recycled.

The K-12 edition's recycling section offers guidance on the following food waste recycling practices and one recycling case study:

- Off-Site Food Waste Management
 - Commercial Composting Fact Sheet
- On-Site Food Waste Management
 - On-Site Aerobic Composting Fact Sheet
 - Vermin Control
 - On-Site Anaerobic Digestion Fact Sheet
 - Recycling Case Study – Reeds Road Elementary School

The higher education edition's recycling section offers guidance on the following food waste recycling practices and two recycling case studies:

- Off-Site Food Waste Management
 - Commercial Composting Fact Sheet
- On-Site Food Waste Management
 - On-Site Aerobic Composting Fact Sheet
 - On-Site Anaerobic Digestion Fact Sheet
 - Vermin Control
- Recycling Case Study – Bergen Community College
- Recycling Case Study – Rutgers University

Each guideline includes appendices to provide additional resources and information on food waste recycling.

Works Cited

Bloom, J. (2011). *American wasteland: how America throws away nearly half of its food (and what we can do about it)*. Cambridge, MA: Lifelong Books/Da Capo Press

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Legislative Summary



Legislative Summary

Legislative Guidance

In accordance with P.L.2017, c.210 (Appendix A) approved August 2017, the New Jersey Department of Environmental Protection developed guidelines in consultation with the New Jersey Department of Agriculture, the New Jersey Department of Education, the New Jersey Department of Health, and the New Jersey Office of the Secretary of Higher Education, for K-12 schools and higher education institutions to reduce, recover, and recycle food waste.

Specifically, P.L. 2017, c.210 requires the School Food Waste Guidelines include:

1. Information on food waste generally and the benefits of reducing, recovering, and recycling food waste.
2. Recommendations for how schools can incorporate this information into their curricula and create programs and activities for the reduction, recovery, and recycling of food waste.
3. Recommendations for how schools can reduce the volume of surplus food they generate.
4. Guidance on how schools can create share tables in their cafeterias.
5. Information on cost-effective, safe, and sanitary means by which schools may donate excess, unused, and edible food to nonprofit organizations that distribute food to nearby individuals.

Why Food Waste



Figure 2: Why Food Waste? Infographic describing the effect wasting food has on our environment, and our wallets.

Introduction



Introduction

What do you think of when someone says, "food waste"? It's possible the extra food left on your plate at the last restaurant you went to comes to mind, or maybe it's those times that someone mentioned how much food you placed in the trash after a meal. Whatever the imagery, it is possible that you are thinking about the food you had left behind from a meal. This is called "plate waste", but food waste is much more. While the EPA defines food waste as "any food that is fit for human consumption that is sent for disposal" (EPA 2018), this guidance will also address non-consumable food waste, such as spoiled food and inedible trimmings. Food waste can consist of unsold food from retail stores, untouched prepared food or trimmings from restaurants, grocery stores, cafeterias or industrial processing facilities (EPA 2018).

Our food waste generation has increased over the past five decades and has placed considerable stress on the United States' resources as a result. Today Americans waste at least 50 percent more food than what we did in the 1970s costing up to \$218 billion each year (NRDC 2017). Getting that food to our table requires 16 percent of the U.S. energy budget, 50 percent of U.S. land, and 67 percent of the freshwater consumed in the nation (NRDC 2017). Reducing, recycling, and recovering food waste can mean more money in our pockets, less strain on landfills, and more food to feed the nearly 42 million Americans who are food insecure and unsure of when they will have their next meal (NRDC 2017). Through effective reduction, recovering and recycling of food waste, schools can reduce overhead expenses and disposal costs associated with food waste. Students who are taught to separate and compost food waste will be more likely to value their food and will learn lifetime habits for minimizing food waste.

Environmental benefits associated with food waste reduction, recovery, and recycling include resource conservation, energy savings, greenhouse gases avoidance, landfill space savings and cost savings for schools. For example, the establishment of a well-run food waste reduction, recovery and recycling program will result in less material disposed as trash which may enable schools to utilize smaller solid waste dumpsters and reduce the number of solid waste pick-ups (often referred to as "pulls"). Negotiating solid waste services for your school with the solid waste hauler can result in considerable cost savings. Furthermore, the avoided cost of disposal must not be overlooked when considering the economic benefits of waste reduction, recovery and recycling. The avoided cost of disposal is the amount of money that is saved by not having to send waste to a landfill or incinerator for disposal. While it varies depending upon the fee charged for garbage disposal at the facility in your area, New Jersey disposal fees average over \$80 per ton and the avoided cost of disposal can be significant. This guideline is meant to advise higher education institutions on how they can effectively reduce, recover and recycle food waste.

Food Recovery Hierarchy

The EPA Food Recovery Hierarchy (below) prioritizes actions schools can take towards reducing, recovering and recycling food waste. The upper levels of the Food Recovery Hierarchy are top priorities because they minimize impacts on the environment, society and economy. The Food Recovery Hierarchy places source reduction as the highest priority and follows with topics associated with food recovery such as feeding hungry people or animals. The lower levels include food waste management strategies such as industrial uses (used cooking oils for biofuel production), composting and landfill/incineration. All these strategies are important to reducing, recovering and recycling food waste as an alternative to sending them to landfill/incineration, and will be discussed in the guidelines.



Figure 3: EPA's Food Waste Hierarchy. EPA's Food Waste Hierarchy prioritizes actions schools can take towards reducing, recovering and recycling food waste. Learn More about the [EPA's Food Recovery Hierarchy](http://www.epa.gov/sustainable-management-food/food-recovery-hierarchy): www.epa.gov/sustainable-management-food/food-recovery-hierarchy.

Getting Started



Getting Started

Designate a faculty leader, and create a club, group or committee



Figure 4: Students at Cornell University's student run food security grocery store named Anabel's. (Cornell Daily Sun)

Creating a food waste management team can help kickstart and maintain a food waste program. Having at least one food service professional is recommended to help facilitate a student-led food waste club, group, or committee. A food waste club, group, or committee can spearhead efforts to train faculty and student volunteers to handle food waste and run food waste best management practice programs. The appointed club, group, or committee should arrange periodic meetings where they can connect and discuss volunteer recruitment and management, training schedules, training protocols, program logistics, share ideas. Creating a supportive, connected community around food waste among students and faculty can help create the most effective and long-lasting food waste movement within higher education institutions.



Figure 5: Michigan University students help serve produce grown on their campus farm (University of Michigan. Planet Blue)



Figure 6: University of Vermont "Eco-Reps" educate fellow students about composting. (aashe.org)

Run a Food Waste Audit



Figure 8: (top) Bins lined up that are being used to separate food waste during a food waste audit.

Figure 7: (bottom) A crew of volunteers help separate and measure food waste during a food waste audit.

A key step to addressing food waste issues in cafeteria settings is to measure the amount of food waste being produced. With an accurate representation of how much food is produced, schools are more motivated and prepared to tackle the challenge of addressing food waste. Food waste can be measured either in the “front of house” or “back of house”. “Back of house”, production side food waste audits are often much simpler than “front of house”, consumption side food waste audits since those working in the kitchen are paid professionals. Kitchen professionals can be trained to divert all food waste produced by the kitchen into five-gallon buckets to be weighed periodically. If more detailed information is preferred, kitchen professionals can be prompted to pay attention to why most food waste is produced and asked to report on what reasons were most common.

In the case of “front of house”, consumption side, food waste audits, require a more detailed data collection method.

Student-produced food waste audits, as they are guided by the US Department of Agriculture) to measure plate waste and interview each food waste contributor so that student volunteers can collect data on what was wasted and why. Interviews are held with each student that wastes food to find out why items are being wasted and what the school could do to prevent it. For example, if many students identify an item as too soggy, the kitchen can make corrections to help prevent that item from being wasted in the future. Follow up food waste audits can reveal if adopted strategies for reducing food waste were successful, and further correct problems that may be contributing to excess food waste. It is recommended for students to organize two food waste audits in a school year to keep students engaged.

Food Waste Audit Steps

- 1. PLAN!** Collect items for the audit, connect with dining services, find location for the audit
- 2. ORGANIZE!** Gather volunteers, decide time intervals for shifts, make a doodle survey, develop a shift schedule
- 3. TRAIN!** Devise an interview question sheet or use what is provided by the USDA, train volunteers on their specific duties, prompt volunteers on the questions they will be asking and how they will be recording them
- 4: RUN!** Set up area with collected items, close off student access to trash cans, weigh an empty bucket to subtract from later weights, walk morning shift volunteers through the procedure and advise them on how to show the next shift to do so, have one or multiple leaders check in throughout the day
- 5: ANALYZE!** Average food wasted and number of students for each meal, create a graph displaying the average food waste produced for each student per meal over time if the study is run on consecutive days

More Information:

For more information check out [EPA's Guide to Conducting Student Food Waste Audits:](https://www.epa.gov/sites/production/files/2017-04/documents/guide_to_conducting_student_food_waste_audit.pdf)
https://www.epa.gov/sites/production/files/2017-04/documents/guide_to_conducting_student_food_waste_audit.pdf

Collect Food Waste



Figure 9: Collection bins for separating trash, food, recycling and “returnables” at the University of Southern Maine. (USM)

A food waste collection program offers many benefits to schools. Aside from diverting food waste from landfills and decreasing disposal costs, having students separate food waste from other wastes familiarizes them with the idea that food waste is a recyclable category of its own. Starting a food waste collection program begins with using measurement methods discussed previously to estimate how much food your school produces, coordinating with a food waste hauler/recycler or developing an on-site composting or digestion program (see Recycling p.24) if not using one currently, setting up collection containers and training staff to help students place the right waste in the right containers. Collection containers can simply be relabeled trash cans already owned by the school or new dedicated containers designed for food waste streams.

More Information:

For more information on diverting food waste check out the Massachusetts DEP's [The Green Team Food Waste Diversion Guide for Schools,](http://thegreenteam.org/wp-content/uploads/2015/08/Food_Waste_Diversion_Guide_for_Schools_%281%29.pdf)
http://thegreenteam.org/wp-content/uploads/2015/08/Food_Waste_Diversion_Guide_for_Schools_%281%29.pdf

Reduction



Reduction

Reduction is the most important action for preventing food waste and is at the very top of EPA's Food Recovery Hierarchy. Reducing food waste prevents the need to deal with excess or spoiled food by not producing the food in the first place. Schools can adopt best management practices that pertain to how food is both handled and served to effectively reduce the food waste they produce and reap the financial and ecological benefits of doing so. The following are food waste reduction best management practices that are recommended for higher education institutions in New Jersey.



Figure 10: EPA Food Waste Hierarchy. The EPA Food Recovery Hierarchy highlighting source reduction to introduce the reduction section of the School Food Waste Guidelines.

Why reduce food waste?

- Saves money from buying and wasting less food
- Conserves energy and resources, preventing pollution involved in the growing, manufacturing, transporting, and selling food (not to mention hauling the food waste and landfilling it).

More information: www.epa.gov/sustainable-management-food

Smart Food Handling Techniques

How food is stored and handled can greatly affect how much pre-consumer food waste is produced. It is estimated that 4 to 10 percent of all food purchased by schools becomes pre-consumer food waste. This food waste consists of overproduction, trim waste, expiration, spoilage, overcooking, contaminated and dropped items. By leading efforts to limit both pre-consumer and post-consumer waste, schools can make significant reductions in food waste and experience cost savings.

Food Purchasing and Storage:

- Use the "First In-First Out Method" of reducing waste by ensuring that food that has been stored the longest ("first in") is the next food used ("first out"). This method can be implemented by placing newest items in the back and oldest items in the front when new deliveries are received.

- Keep records of food thrown away from overproduction, expiration, spoilage, trimming or handling issues. Give staff incentives and training to reduce the waste that appears most in the records.
- Streamline inventory control to reduce the amount of excess and out-of-date inventory.
- Adjust inventory levels if it is found that certain perishables tend to experience spoilage or dehydration.
- Wrap freezer products tightly, label and date them, and ensure that they are used as fast as possible to prevent freezer burn.
- Restore hydration in vegetables such as celery, lettuce, carrots and broccoli by trimming off the very bottom part of the stalk and immersing them in warm water (100°F) for 15 to 20 minutes.
- Store leftovers properly to minimize spoilage. Use leftover foods within two days of preparation to minimize spoilage.
- Do not accept samples or food donations that may become food waste.
- Work alongside suppliers to minimize and send back materials used for packaging and shipping.

Meal Preparation:

- Review menus frequently and reduce or eliminate commonly wasted items.
- Have secondary uses for menu items in case that they are over produced.
- Design menu cycles to allow for secondary uses of food (e.g. chicken sandwiches, chicken casserole, then chicken soup).
- Utilize hourly or daily production charts to prevent over prepping.
- Only trim what is not needed when preparing food and use trimmings for meat and vegetable stock when possible.
- Allow patrons to purchase smaller portions.
- Make portions smaller if a menu option is consistently disposed of.



Figure 11: Rutgers University chefs prepare meals for students. (Rutgers University)

Trayless Dining

Campuses have reported 20 to 50 percent waste reductions by using trayless dining at all-you-can-eat facilities. The food service provider, Aramark, released a report titled “The Business and Cultural Acceptance Case for Trayless Dining” where it announced trayless campuses were able to reduce their food waste by 25 to 30 percent (Bloom 2011). Another study conducted at Virginia Polytechnic Institute of about 28,000 students concluded that a week without trays at one dining hall produced 30 percent less food waste (Bloom 2011). These studies, also show that trayless dining reduces costs in participating schools because students took less food, so schools did not have to prepare as much (Bloom 2011).

Food Waste Reduction Case Study

Rutgers University



Figure 12 A Rutgers University student uses two plates to collect food from a dining hall but is not able to carry more plates at one time without a tray.

Significant quantities of edible food are wasted every day by students in college dining halls throughout the United States. While students do not look to waste food, it is very easy to load up a tray with more food than one wants or needs. The result is that many tons of food go uneaten and wind up in the trash. This is not only a wasteful practice, but an expensive one, as well. Wasted food leads to higher food purchasing expenses for schools and higher disposal costs. One method used by colleges around the country to address this situation is the adoption of a trayless dining program. A 2008 study of 25 college

campuses found that removing trays at dining halls results in as much as 25 to 30 percent less wasted food. Rutgers University first implemented trayless dining in 2014 and immediately saw positive results. In the first ten weeks of its trayless program, Rutgers saved \$300,000 in food costs and saw a 20 percent reduction in the amount students toss in the trash after they eat. The transition to trayless dining is not a difficult one for students since it does not limit the amount of food they may eat, but only what they waste. This simple, yet effective, food waste reduction strategy is one of many strategies that colleges can utilize to make their campus dining operations more sustainable. A Rutgers University student uses two plates to collect food and is not able to carry more plates without a tray. receives a meal from a dining hall without using a tray.

More Information:

For more information about reducing food waste visit the [EPA's Sustainable Food Management webpage](http://www.epa.gov/sustainable-management-food/sustainable-management-food-basics#what) www.epa.gov/sustainable-management-food/sustainable-management-food-basics#what

Recovery



Recovery

Food recovery is the process of preventing edible food from being wasted at restaurants, grocery stores, markets, or dining facilities by donating excess to food banks, food pantries, or soup kitchens under certain legal requirements. Many schools have initiated food waste recovery actions by donating whole, unused, and unopened food items where they are needed. Food recovery programs can raise a school's awareness about what is most wasted and what can be adjusted to limit food waste in the production 'back of house' side. They also strengthen the community by fostering relationships among food service departments, parents, students, and community organizations, as well as altering how students think about their food, where it comes from, and what happens when it is not eaten.

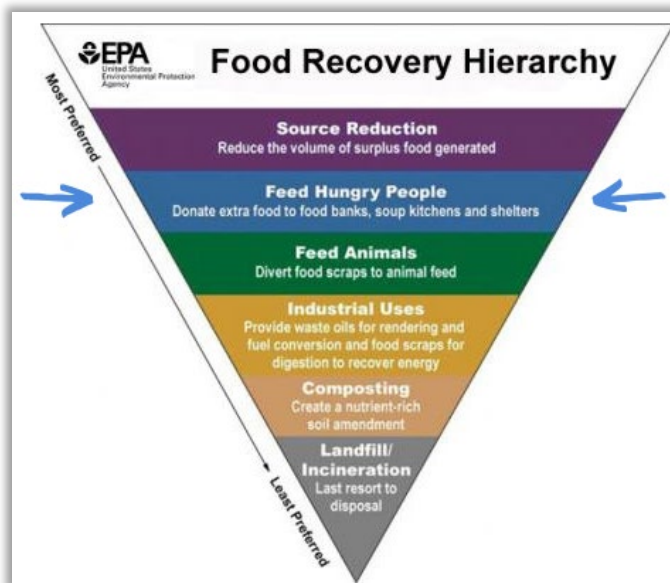


Figure 13 The EPA Food Recovery Hierarchy. The EPA Food Recovery Hierarchy highlighting the feed hungry people section to introduce the recovery section.

Why recover food waste?

- Feeds people, not landfills. Sends food where it is needed instead of creating waste.
- Bolsters connections between community members.
- Helps non-profits improve financially through food donations.

More information: www.epa.gov/sustainable-management-food

Connecting with a school food recovery network

School food recovery networks provide resources and connections to optimize or jump start a food waste program. For higher education institutions we recommend:

Recommended School Recovery Network

Food Recovery Network



In September 2011 a student group at the University of Maryland founded the Food Recovery Network. Today, it is the largest student movement against food waste and hunger, recovering and donating more than 2 million pounds of food that would have gone to waste otherwise. That's more than 1.8 million meals that have gone to those in need. To connect with the organization or start a chapter, check out their website. www.foodrecoverynetwork.org/

More information: <https://campuskitchens.org/>

Implementing a Food Recovery Program

Guidance from the New Jersey Department of Health

There are many ways for schools to participate in food recovery programs including donating excess prepared food, produce, packaged foods and canned goods to food banks, fundraising, and training volunteer food workers. The following specifies the requirements of each the responsible parties for safely implementing a School Food Recovery Program

Definitions

Donate means to provide food free of charge or for a fee sufficient enough to cover the cost of storing, transporting, otherwise handling the food.

Donor School means a public or nonpublic school, or an institution of higher education that provides food for donation to a Food Distribution Organization or Receiving Facility.

Food bank means a nonprofit food clearinghouse that solicits, stores, and distributes combinations of edible but unmarketable surplus food. The food is distributed to nonprofit organizations that feed the needy.

Food Distribution Organization means an organization that accepts donated food and directly distributes it to needy consumers or, in some cases, distributes donated food to a Receiving Facility which will then directly distribute it to the consumer. The Food Distribution Organization and the Receiving Facility may be one and the same.

Food recovery means the collection of wholesome food for distribution to people in need.

Nonprofit organization means an organization incorporated under the provisions of Title 15 or Title 16 of the Revised Statutes of NJ, an organization exempt from taxation under section 501(c)(3) of the Internal Revenue Code or an entity to which charitable contribution as defined under subsection (c) of section 170 of the IRS code is deductible under section 170.

Excess prepared food means any extra, wholesome, unwrapped, ready-to-eat food that was prepared for service, but not served to students or offered for service to students from a buffet or other self-service setting. Such foods may include but are not limited to cooked meats, poultry, pasta, vegetables, starches, and deli trays, and vegetable trays

Person in charge means the individual present at a retail food establishment who is responsible for the operation at the time of inspection.

Receiving Facility means a nonprofit organization such as a food bank, food pantry, or soup kitchen that accepts donated food and directly distributes it to the consumer.

TCS (time/temperature control for safety) food means a food that requires time and/or temperature control to limit pathogenic microorganism growth or toxin formation. TCS food includes an animal food that is raw or heat-treated; a plant-based food that is heat-treated; raw seed sprouts, cut melons, cut leafy greens, and cut tomatoes.

Regulatory Requirements

The Bill Emerson Good Samaritan Food Donation Act

The federal Bill Emerson Good Samaritan Food Donation Act asserts that covered parties engaged in covered donation activities “shall not be subject to civil or criminal liability arising

from the nature, age, packaging, or condition” of the donated items if requirements stated by the Act are met by donors. These include:

- The donated items must be apparently wholesome food.
- The covered party must donate the items in good faith.
- The donation must be made to a nonprofit organization.
- The nonprofit must distribute the donated items to needy individuals.

New Jersey’s Retail Food Rules N.J.A.C. 8:24-1 “Chapter 24: Sanitation in Retail Food Establishments and Food and Beverage Vending Machines”

In New Jersey, Donor Schools, Food Distribution Organizations and Receiving Facilities are classified as retail food establishments. As such they are subject to regulation and inspection under the provisions of N.J.A.C. 8:24-1 et seq. entitled: “*Chapter 24: Sanitation in Retail Food Establishments and Food and Beverage Vending Machines*” (aka Chapter 24 rules). The Chapter 24 rules are enforced by the State and/or local health department.

Food Safety Concerns for Handling Donated Foods

It is essential that the foods donated to the needy are safe for consumption. Donated foods are often served to persons with weakened immune systems such as very young children, the elderly, and people receiving medical treatment. These individuals are highly susceptible to foodborne illness.

The Food and Drug Administration has identified the following five “foodborne illness risk factors” that contribute to foods becoming unsafe to eat:

1. Food from unsafe sources.
2. Poor personal hygiene (i.e. ill food workers; failure to wash hands; and bare hand contact with ready-to-eat food).
3. Failure to cook animal-based foods to safe temperatures.
4. Holding time/temperature control for safety (TCS) foods at improper temperatures.
5. Contaminated equipment (i.e. failure to clean and sanitize food prep equipment).

To ensure the safety of donated foods, the above conditions need to be controlled at every point of food production, distribution and service.

Suitability of Foods for Donation

Most foods are suitable for donation if they are handled properly. Perishable and excess prepared TCS foods may be donated if the Donor School, the Food Distribution Organization and the Receiving Facility can provide the equipment necessary to maintain the foods at required temperatures throughout preparation, storage, holding, transport and serving. Examples of the different classifications of foods and corresponding food safety controls is listed below:

- Commercially Packaged Non-perishable foods
 - **Examples:** Shelf-stable packaged foods, canned goods, canned or bottled beverages, packaged chips, snack foods and candy.
 - **Controls:** Packaging intact, canned goods not rusted or severely dented.

- Perishable foods
 - **Examples:** Baked goods without cream fillings, bread, rolls. Raw, whole, uncut fruits and vegetables.
 - **Controls:** Product not visibly spoiled and protected from contamination.
- Commercially Packaged TCS Foods
 - **Examples:** Prepackaged milk, yogurt, cheese, deli meats.
 - **Controls:** Product maintained at 41 °F or below; packaging intact.
- Excess Prepared Foods (Cold)
 - **Examples:** Sandwiches, vegetable salads, pasta salads, protein salads, fruit cups.
 - **Controls:** Timely handwashing/no bare hand contact; foods prepared in a sanitary manner, product maintained at 41 °F or below.
- Excess Prepared Foods (Cooked)
 - **Examples:** Cooked meats, fish, poultry, gravy, soup, vegetables and pasta.
 - **Controls:** Timely handwashing/no bare hand contact; foods prepared in a sanitary manner, foods cooked to required temperatures; hot foods maintained at or above 135 F; foods rapidly chilled (frozen) by the Donor School prior to pick up by the Food Distribution Organization; product maintained frozen until reheated; and product properly reheated at the Receiving Facility.
- Foods Not Suitable for Donation
 - Prepackaged TCS foods that have been held out of temperature control.
 - Excess prepared foods that have been held out of temperature control.
 - Excess prepared foods that have been served to students.
 - Excess prepared foods that have been offered for self-service to students (i.e. through a salad bar or open buffet).
 - Exposed perishable foods that have been served to students.
 - Rusted or severely dented cans.

Roles and Responsibilities

It is essential for the Donor school, Food Distribution Organization and Receiving Facility to work together to establish operational policies and procedures to ensure that donated foods are handled in accordance with the Chapter 24 rules. The policies should address the following:

- Key Contacts: Names, addresses, email addresses and phone #s.
- The types of foods to be donated.
- The food transport arrangements including:
 - Who will transport food from the Donor School to the Receiving Facility.
 - The type of vehicle(s), temperature-holding equipment that will be used.
 - Distance in miles and time between the Donor school and the Receiving facility.
 - Anticipated frequency, times and dates for pickup of donations.
 - Contingency plan in case of vehicle breakdown or emergency.

I. Responsibilities of the Donor School

The Donor School is required to be licensed and inspected by the local health department. The person in charge of the Donor School is responsible for ensuring that:

- The local health department has been notified in advance of the Donor School's participation in the food recovery program.
- No donated food has been previously served or exposed to students through a self-serve buffet or salad bar.
- Donated foods have been prepared in a safe and sanitary manner in accordance with the requirements of Chapter 24.
- Meats, poultry, fish, eggs have been cooked to the required minimum temperatures as specified under N.J.A.C. 8:24-3.4.
- TCS foods are maintained under required temperature control throughout all phases of food preparation and service.
- All cooked excess prepared foods have been rapidly chilled as specified under N.J.A.C. 8:24-3.5. Note: The NJDOH recommends that whenever practical that all excess prepared foods are immediately frozen onsite by the Donor School prior to pick up.

II. Responsibilities of the Food Distribution Organization

The Food Distribution Organization is required to be a nonprofit organization that has been licensed and inspected by either the State or local health department. The Food Donation Organization is responsible for ensuring that:

- Donated foods are in good condition.
- Donated foods are transported in a manner to prevent contamination.
- TCS foods are maintained at required temperatures (41 F or below) throughout transport and storage.
- Transport units are equipped with refrigeration or insulated carriers with ice packs for maintaining TCS foods at required temperatures during pick up, transport and delivery to the Receiving Facility.

III. Responsibilities of the Receiving Facility

The Receiving Facility is required to be a nonprofit food bank, soup kitchen, or food pantry that has been licensed and inspected by either the State or local health department. The person in charge of the Receiving Facility is responsible for ensuring that:

- All foods have been protected from contamination during transport.
- All packaged foods are intact, foods are wholesome and in otherwise acceptable condition.
- All refrigerated TCS foods are received at required temperatures (41 F or below) and stored under refrigeration until used.
- All foods are protected from contamination during storage and preparation.
- Foods are handled properly.
- Cooked foods are reheated to required temperatures (165 F) prior to serving.
- Foods that are delivered out of the safe temperature range are discarded.
- Records are maintained of the foods that are received.
- The Food Distribution Organization is advised of any deviations in the food delivery requirements.

Food Safety Training and Certification

Food safety training is an integral part of managing food donations and distribution. N.J.A.C. 8:24-2.1(b) requires that at least one person in charge of both the Donor School and the Receiving Facility be currently certified food protection manager. Currently, the following food protection certification programs are recognized: ServSafe, National Registry for Food Protection, 360 Learning Learn2Serve, Thomson Prometric, or State Food Safety.com.

The person in charge is also responsible for pertinent food safety training to food workers and volunteers. The basic food safety training should cover timely handwashing practices; proper use of single-use gloves; prohibition of bare hand contact with ready-to-eat foods; proper cooking temperatures of specific foods; proper hot holding and cold holding temperatures of TCS foods; and proper equipment cleaning and sanitization methods.

Recordkeeping

The Donor School should maintain proper documentation as listed below:

- Log book listing the food product, production date, amount of food donated, donation site and date.
- Temperature logs of refrigerated TCS foods such as sandwiches and commercially sealed meals.
- Temperature logs of refrigeration temperatures.
- Temperature logs of food cooling processes.
- Refrigerated trucks should include documentation of daily temperature checks of the vehicle.
- All food safety training certificates.

Recovery Case Study

Table to Table

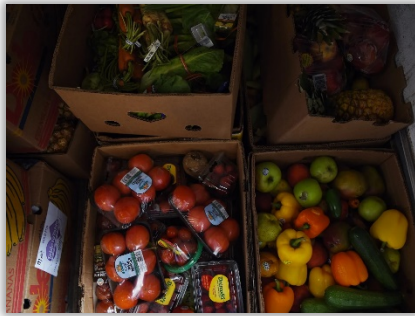


Figure 15 (top) Produce recovered during a pick up by Table to Table.

Figure 14: (bottom) Table to Table volunteers loading a truck with recovered food.

Table to Table is a community-based food rescue program that collects prepared and perishable food that would otherwise be wasted and delivers it to organizations serving the hungry in the Bergen, Essex, Hudson, and Passaic counties of New Jersey. In almost every facet of the food industry, there are overages of edible, nutritious food being wasted. Table to Table obtains this from about 200 donors (supermarkets, distributors, restaurants) and delivers it the same day free of charge to over 100 community organizations including soup kitchens, homeless shelters, after-school programs and homes for the elderly. Table to Table operates a fleet of refrigerated vehicles to respond quickly to unscheduled calls. In 2017, Table to Table “rescued” enough food for 19 million meals but hopes to provide at least 20 million meals per year in the future.



More Information:

For more information about Table to Table check out tabletotable.org/

Recycling



Recycling

It's estimated that a single student can generate over two pounds of compostable materials, such as food scraps and soiled paper, each day (NERC 2010). That means a large amount of compostable materials will unnecessarily be sent to landfills if not diverted and recycled. Recycling school food waste significantly reduces a school's municipal solid waste stream and creates an avenue for the waste to be recycled. There are many options for recycling food waste. Schools have the option to send food off-site to be handled by contracted food waste recycling facilities or facilitate their own on-site food waste recycling program.



Figure 16: The EPA Food Recovery Hierarchy. The EPA Food Recovery Hierarchy highlighting feed animals, industrial uses, and composting to introduce the recycling section of the School Food Waste Guidelines.

Why recycle food waste?

- Generates compost, enriching the soil and reducing the need for chemical fertilizers.
- Reduces methane emissions from landfills, a potent greenhouse gas, and lowers carbon footprints.

More information: www.epa.gov/sustainable-management-food

Off – Site Food Waste Management

Sending food waste off-site to be used by an animal farming facility or a commercial composter may be the most accessible recycling method for schools, especially those in urban settings where space is limited. The cost of off-site food waste hauling may be offset by the reduced disposal fees from the lower tonnage of municipal solid waste. Conducting a food waste audit prior to contacting haulers and/or composting facilities may help haulers, farms and composters assess whether they can accept your school's food waste (see Run a Food Waste Audit p. 10).

Using food scraps for animal feed

Schools in the proximity of an animal farming or animal feed processing facility may be able to send their food scraps for animal feed. Using food scraps as animal feed often requires less processing and is a more direct use of energy than recycling food waste into compost.

Using a commercial food waste recycling facility

Commercial composting requires schools to connect with a hauler and/or commercial composting facility that will handle food waste they generate. Commercial composting provides a service to schools that may not have the labor, resources, or space to run a full on-site composting operation.

Commercial Food Waste Management

Fact Sheet

Labor demands: A moderate amount of work is needed to collect food waste and other organic compostable materials, can be done by faculty or students high school aged or older.

Materials that can be composted: Meat, bones, fish, dairy, baked goods, fruits and vegetables, food-soiled paper, paper towels, sawdust, and wood chips. May vary between facilities.

Advantages: An on-site composting area and excess labor is not needed, resulting product will be high quality.

Disadvantages: Outsources food waste management, taking hands-on food waste recycling opportunities away from students.



Figure 17: A commercial composting operation turns its windrow pile to help with decomposition. (AgChoice).

On – Site Food Waste Management

Schools that choose to recycle food waste on-site can use either an aerobic process or an anaerobic digester. All on-site composting operations require a long-term commitment from schools to operate and maintain the compost site.

Aerobic Composting

Aerobic composting, or ‘open air’ composting, is often low-cost and relatively simple method of recycling food waste into compost. This approach requires either the use of bins or piles, students to learn the natural process of composting first-hand. Bins and piles can be built in many different ways. For more information on choosing and implementing the right style for your school, visit the [NERC’s resource *Composting School Food Scraps and Soiled Paper* \(pdf\)](https://www.nerc.org/documents/composting_school_food_paper.pdf) [nerc.org/documents/composting_school_food_paper.pdf](https://www.nerc.org/documents/composting_school_food_paper.pdf)

On-Site Aerobic Composting

Fact Sheet

Labor demands: A moderate amount of work is needed to turn and add to piles, and can be done by K-12 and higher education students with supervision.

Materials that can be composted: Fruits and vegetables, grains, egg shells, vegetative wastes, coffee grounds, coffee filters, food-soiled paper, paper towels, napkins, wood chips.

Advantages: Cost-effective and usually easy to maintain, allows students to experience and learn about composting first-hand.

Disadvantages: Has to be constantly maintained, food waste diversion must be done to prevent contamination from plastics and other materials that may accidentally be introduced by students.

Vermin Control



Figure 18: Oranges, lemons, cucumbers, and kale ready to be composted. Make sure to never add meat, cheese, and leftovers or a lot of oil and seasoning to compost piles and bins. (Lori Van Buren/Times Union)

Vermin control is a critical part of maintaining a compost bin or pile. The most important method of keeping pests at bay is to never add meat, cheese, and leftovers containing a lot of oil or seasoning to on-site piles or bins. Make sure to keep food waste in containers with tightly fitting lids before they are added to bins or piles, and turn piles immediately after adding food waste to cover it and deter pests. If clean holes are noticed on the surface of a pile or a bin contact a local pest specialist to determine if pests are present and how to get rid of them.

Some bins can be bought pre-fitted with rodent deterrents. To effectively rodent-proof an existing bin it is recommended to line the bottom and outside walls with galvanized mesh, make sure the lid fits snugly, and pile rocks or bricks around the outside bottom edge to keep out burrowing animals. When lining bins with a galvanized wire mesh hardware cloth to line the bottom and outside walls of a compost bin, use a 0.5 cm, 16 gauge hardware cloth to keep out mice and a 1 cm, 20 gauge hardware cloth to keep out larger pests. Make sure to never use chicken wire as a substitute for galvanized wire mesh hardware cloth.

Anaerobic Digestion

Anaerobic digestion occurs when organic matter, such as food waste, is deprived of oxygen and allowed to decompose. The process of anaerobic digestion uses a different set of organisms and conditions than aerobic composting. Anaerobic digestion uses the word “digestion” because it produces an acidic environment that loosely resembles what is produced in the stomachs of humans and animals. Both anaerobic and aerobic decomposition kill pathogens and weed seeds in organic matter: aerobic decomposition uses heat while anaerobic digestion uses acidity.

Anaerobic digestion produces two valuable products. It produces biogas (methane and carbon dioxide), a renewable energy source and left over material called “digestate”, a fertilizer. The cost of an anaerobic digester can be considerably higher than the costs associated with aerobic composting.

Anaerobic Digestion

Fact Sheet

Labor demands: A skilled professional is needed to maintain and contribute food waste to digesters.

Materials that can be composted: Usually accepted materials include meat, bones, fish, dairy, baked goods, fruits and vegetables, some paper materials, fats, oils and grease.

Advantages: Creates renewable energy in the form of biogas, creates less odor, may accept an array of organic materials and creates a sterile fertilizer.

Disadvantages: Equipment and maintenance can be costly and can create environmental and safety hazards if not managed properly.

More Information:

For more information visit the NERC’s resource [Composting School Food Scraps and Soiled Paper](http://nerc.org/documents/composting_school_food_paper.pdf).
nerc.org/documents/composting_school_food_paper.pdf

Recycling Case Study

Bergen Community College

Bergen Community College, located in Paramus, New Jersey collects food waste from their cafeteria kitchen and dining hall and composts the material either on-site in a Rocket Composter or at an off campus site. Thanks to this program, almost all campus food waste is recycled. An in-vessel composter, purchased by Bergen Community College in 2011 through a matching grant program made available by the New Jersey Department of Environmental Protection, has enabled the college to transform ten tons or more of food waste each year into a nutrient-rich soil amendment, which is used in the school’s horticulture programs and community garden. As part of the school’s program, the cafeteria supplies compost-friendly utensils to diners. In addition, the school’s food waste composting program is used for educational and instructional purposes for students interested in the environment and sustainability.



Figure 19 Volunteers of Bergen Community College tend to the college’s in-vessel composter.

Recycling Case Study

Rutgers University

Rutgers University owns and operates a cogeneration system, which enables the school to use its waste cooking oil as a readily available fuel source to generate on-site electricity and hot water. Waste cooking oil from the school's many food service operations is collected and then sent to the Busch Dining Hall on the Piscataway campus where it is burned by the system. The power generated by the system is fed into the building's electrical system for general consumption. Furthermore, the heat exchangers installed in the cooling cycle of the system boost the returning hot water loop that circulates throughout the building. Since the system's start-up



Figure 20: Rutgers University's cogeneration system.

in December, 2013 an estimated 11,146 gallons of waste vegetable oil have been used as renewable fuel to produce 63,768 kW of electrical power, with a total run time of 11,146 hours. The use of this system has enabled Rutgers University to avoid 127,559 pounds of carbon dioxide emissions. The cogeneration system was purchased through a matching grant program made available by the New Jersey Department of Environmental Protection and is one of the many innovative programs initiated by Rutgers University to manage their various food waste streams in a more sustainable manner.

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Appendix A

Chapter 210

AN ACT concerning food waste in K-12 schools and institutions of higher education, supplementing Title 13 of the Revised Statutes, and amending P.L.1982, c.178.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

C.13:1E-99.115 Guidelines for handling food waste for certain institutions.

1. a. Within 90 days after the effective date of this act, the Department of Environmental Protection, in consultation with the Department of Agriculture, the Department of Education, the Department of Health, and the Office of the Secretary of Higher Education, shall establish, or work with appropriate nonprofit organizations to establish, voluntary guidelines to encourage and facilitate the ability of K-12 schools and institutions of higher education to reduce, recover, and recycle food waste.

b. The guidelines shall include, but need not be limited to:

(1) information on food waste generally, and the benefits of reducing, recovering, and recycling food waste;

(2) recommendations for how schools can incorporate this information in their curricula, and create programs and activities for the reduction, recovery, and recycling of food waste;

(3) recommendations for how schools can reduce the volume of surplus food they generate, including, but not necessarily limited to, conducting food audits, eliminating trays in cafeterias, enacting longer lunch periods, scheduling lunch periods after recess, establishing “offer versus serve” policies, and allowing students to keep uneaten food;

(4) guidance on how schools can create share tables in their cafeterias where students may return uneaten food that is still in its original packaging or peel for consumption by other students, resale, or donation;

(5) information on cost-effective, safe, and sanitary means by which schools may donate excess, unused, and edible food to food banks, food pantries, soup kitchens, and other nonprofit organizations that distribute food to needy individuals; and

(6) information on how schools can recycle their food waste, including the creation of onsite composting programs.

c. The Department of Environmental Protection, the Department of Education, and the Office of the Secretary of Higher Education shall post the guidelines on their respective Internet websites.

2. Section 2 of P.L.1982, c.178 (C.24:4A-2) is amended to read as follows:

C.24:4A-2 Definitions.

2. As used in this act:

"Donate" means to provide food free of charge or for a fee sufficient only to cover the cost of storing, transporting, or otherwise handling the food.

"Donor" includes, but is not limited to, any farmer, processor, distributor, or wholesaler or retailer of perishable or prepared food, a public or nonpublic school, or an institution of higher education in this State.

"Food" means articles used for food or drink for humans and articles used for components of any such article.

"Food bank" means a nonprofit food clearinghouse that solicits, stores, and distributes donations of edible but unmarketable surplus food. The food is distributed to nonprofit organizations that feed the needy. P.L.2017, CHAPTER 210 2

"Gleaner" means a person who harvests for distribution an agricultural food that has been donated by the owner.

"Nonprofit organization" means an organization incorporated under the provisions of Title 15 or Title 16 of the Revised Statutes of New Jersey, an organization exempt from taxation under section 501(c)(3) of the Internal Revenue Code or an entity to which a charitable contribution as defined under subsection (c) of section 170 of the Internal Revenue Code is deductible under section 170.

"Perishable food" means any food that may spoil or otherwise become unfit for human consumption because of its nature, type or physical condition. Perishable food includes, but is not limited to, fresh or processed meats, poultry, seafood, dairy products, bakery products, eggs in the shell, fresh fruits or vegetables and foods that have been canned or otherwise processed and packaged and which may or may not require refrigeration or freezing.

"Prepared food" means food commercially processed and prepared for human consumption.

3. This act shall take effect immediately.

Approved August 7, 2017.

Appendix B

State of New Jersey Food Waste Guideline Resources *Resources for Higher Education*

Instructional Resources		
Name	Description	Type of Network
<u>Campus Kitchen Project</u>	A student-powered hunger relief organization, teaming up with universities to recover food waste.	Food Recovery
<u>Food Recovery Network</u>	A national nonprofit that unites higher ed. students to fight food waste and hunger.	Food Recovery
<u>Post Landfill Action Network (PLAN)</u>	Plastic-free initiatives, waste audits, free & thrift stores, sustainable move in/move out, expanded recycling, food recovery & composting.	Zero Waste

Program Resources		
Resource	Description	Audience(s)
<u>A Guide to Conducting Student Food Waste Audits</u>	A resource for schools from the U.S Environmental Protection Agency	Professors, administrators, food service staff, students
<u>Food and Dining - AASHE Campus Sustainability Hub</u>	A one-stop shop for members to access toolkits and resource collections about all aspects of sustainability in higher ed.	Professors, administrators, students
<u>Menus of Change</u>	An initiative designed to improve the nutritional value of the food people eat while reducing its impact on the environment.	Administrators, food service staff
<u>Save the Food</u>	Links, media resources, and fact sheets for reducing waste	All stakeholders
<u>School Gardens</u>	Resources on a variety of school food initiatives, from videos to webinars, from Extension.org	Teachers, administrators, food service staff

<u>TED Talk: The Global Food Waste Scandal</u>	Tristram Stuart discusses data on international food waste in his 2012 TED Talk	Teachers, administrators, food service staff, students
<u>Wasted Food</u>	Informational text and additional resources from <u>Johns Hopkins Center for a Livable Future</u>	All stakeholders
<u>Why (And How!) Your School Should Do a Student Food Waste Audit</u>	From the <u>Sustainable America</u> blog, ways to get students involved in the food waste audit process	Teachers, administrators, food service staff, students

**These resources are provided for informational and convenience purposes only. Neither the Department of Education nor its officers, employees or agents, specifically endorse, recommend or favor this program or the company/entity hosting the program. In addition, references in this document to any specific commercial product, process or service, or the use of any trade, firm, or corporation name is provided for informational and convenience purposes only, and do not constitute endorsement, recommendation or favoring by the Department of Education, or its officers, employees or agents.*

Appendix C

School Food Waste Recycling How-To.

Steps for sending food waste off-site to be fed to livestock, composted or anaerobically digested

Locate a compost facility or farm

Visit the “[find a composter](http://www.findacomposter.com)” website (www.findacomposter.com), or contact local solid waste officials or the school’s current recycling or waste hauler to check if they know any compost operations in the area. Check the Internet or contact farm organizations such as the Farm Bureau for farm listings. Find contacts at state and regional agricultural agencies, soil conservation agencies, and farmers markets associations. Compile a list of farms or facilities that raise chickens or pigs, run horticulture or greenhouse operations or utilize waste to fuel digesters.

1. *Initiate contact*

Inquire about whether the farm or facility is interested in accepting the school’s food scraps. Use food waste audit data to provide an estimated amount of organic waste generated by the school.

2. *Determine the materials to collect*

Discuss what materials are accepted by the farmer or facility operators. Materials that are generally accepted include soiled paper (such as napkins), a majority of food scraps (including meat); although livestock operations may only accept vegetable material.

3. *Develop a collection plan*

- Determine how the materials will get from the school to the farm or facility.
 - Options include the farmer collecting the materials, a parent volunteer opting to transport the materials, the school’s current recycling hauler agreeing to haul the materials.
- Find out if the hauler will provide storage containers.
- Determine how much money it will take to transport the materials.

Determine how materials will be diverted. Five-gallon buckets with lids are low cost and small enough to carry. These buckets can be obtained from restaurants or stores. Curbside bins or trash cans with compostable liners will also work.

Steps for performing On-Site Anaerobic Digestion

Anaerobic digestion of organic materials occurs in closed spaces that are deprived of air. Without oxygen, microorganisms consume the organic materials present and produce methane. Methane is not produced from aerobic (open air) composting. Methane produced from anaerobic digestion can be collected and separated from other gasses and used as biogas. Methane is the primary component of natural gas. Digestate is the material left over from the anaerobic digestion process and can be collected and used as a soil amendment and fertilizer. All anaerobic digestion systems adhere to the same basic principles whether the feedstock is food waste, animal manures or wastewater sludge. Figure 13 (below) displays the typical process of an anaerobic digestion system.

1. Measure the amount of food waste your school generates

Anaerobic digestion systems require a consistent supply of feedstock to operate efficiently. A school-wide food waste study would help advise if you have enough food waste to support an anaerobic digestion system, and what size system will work best for you.

2. Find a permanent outdoor location for the composting site

Choose a site that will be near the cafeteria for easy waste transport, but should be placed a reasonable distance away from school buildings, residences and businesses, streams, ponds, wetlands, and wells.

3. Receive approval

Receive approval of the location by school officials, custodians, food service staff, teachers (especially physical education teachers), and neighbors, if appropriate. This will ensure school activities will be able to proceed normally once it is built.

4. Decide how the school will collect and transport the food waste feedstock

Decide where to place collection bins in school and devise signage to help students properly separate their food waste from other waste materials they may have. In large cafeteria settings, it may be helpful to have a food waste bin monitor so that students are less likely to misplace their waste items. Create a collection schedule for the bins throughout the schools and how you will transport them or their contents to the digestion site. Food waste can be added to the digester as feedstock once it is produced, if space within the digester allows.

5. Equipment/supplies

Consider what supplies you will need to transfer food waste from bins to the digester, and remove digestate from the digester. If shovels and additional bins are needed, ensure that they are available.

Anaerobic Digestion Diagram

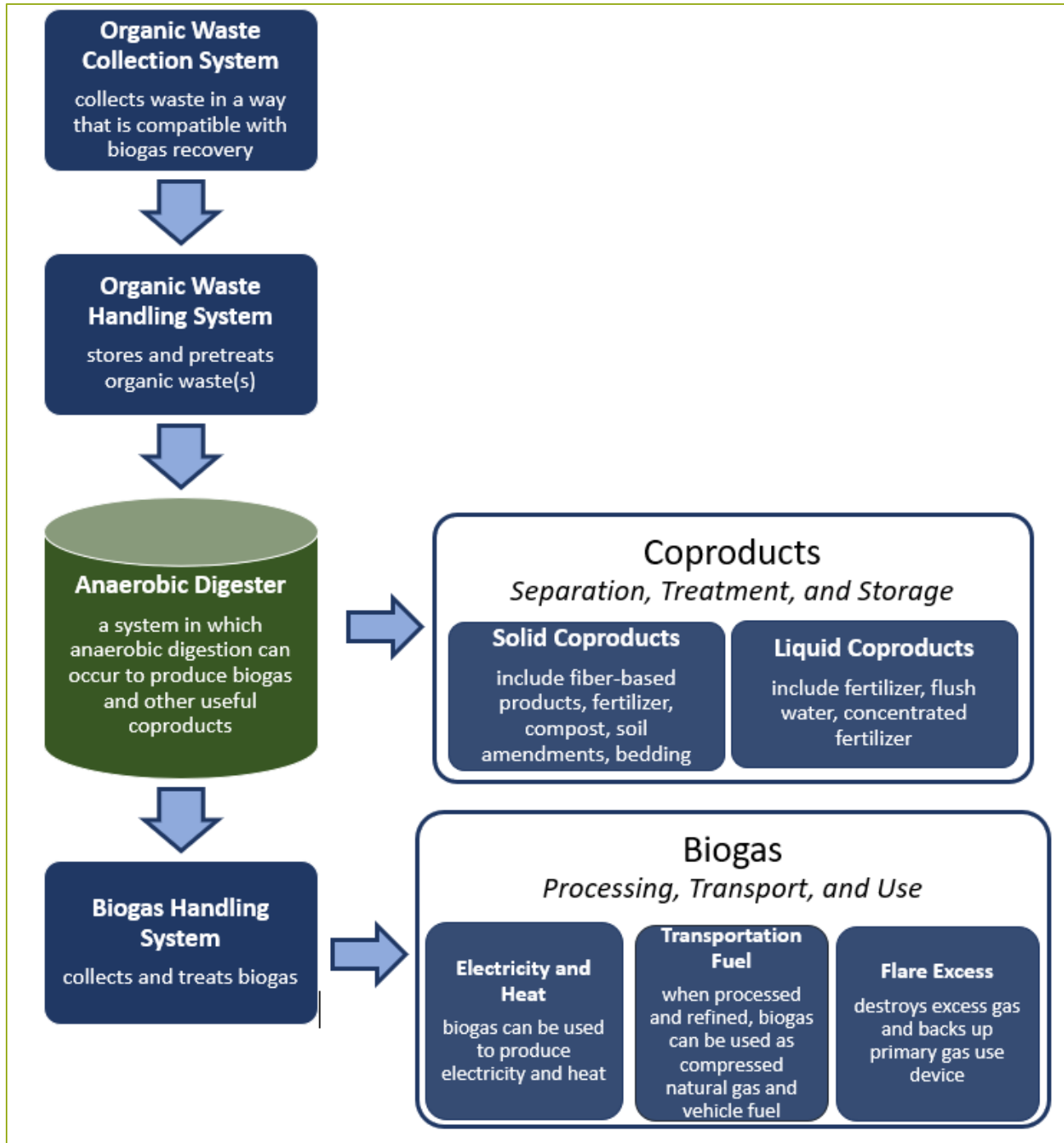


Figure 19: Anaerobic Digestion Diagram. Diagram of the typical process of anaerobic digestion including collection, processing, anaerobic digestion, treating biogas, and using coproducts and biogas.

General Anaerobic Digestion System Maintenance Tasks

General Engine Maintenance (every week)

Similar to a car, the generator that produces electricity from the anaerobic digester must also be inspected and maintenance accordingly each week.

Preventative Engine Maintenance (every month)

The electrical, fuel and air intake systems must also be inspected each month.

Pump Clearing (every 3 to 6 months)

When pumping high solids content waste, it is important to ensure that pumps are cleared of debris regularly.

Iron Packing Replacement (every 6 to 12 months)

If biogas collected from the digesters is being refined and used for electricity generation, it is important to remove the corrosive hydrogen sulfide compounds to avoid engine replacement. Passing the biogas through iron packing material is used to help this issue. The iron packing should be replaced at least every 12 months.

Valve Leak Checks (every 6 to 12 months)

Valves on the digestion system must be checked for leaks at least one to two times a year to avoid safety hazards. If valves are not working properly, they should be replaced immediately.

Pipe Leak Checks (every 6 to 12 months)

Check pipes at least once per year. Make sure to never have open flames near inflow or outflow pipe lines.

Fittings Leak Checks (every 6 to 12 months)

Fittings that are made of nonmetal materials, such as ducted vents, plastic valves, and rubber fittings, located throughout the gas or waste pipeline must be inspected at least once a year.

Sludge Removal (every 1 to 2 years)

An anaerobic system's sludge must be cleared and cleaned out periodically. A well-designed system will perform this task automatically with very little maintenance time needed. Designs that do not have this function will need their sludge manually removed periodically.

Steps for Performing On-Site Aerobic Composting

1. Find a permanent outdoor location for the composting site

Site dimensions of ten feet by ten feet are recommended, depending on how much waste will be incorporated. Small areas are sufficient for class projects and smaller schools. If all the school's food waste will be incorporated, a larger area is necessary.

- If compost bins are used it is recommended that at least two bins are used. The first bin can be filled and closed off to 'cook' and produce compost, while the second bin is open to take new materials. Once the first bin is finished, the second bin can be closed off and a cycle can continue. Multiple bins are needed for larger schools.

2. Determine other materials needed for successful composting

Successful composting requires a ½ ratio of nitrogen to carbon materials. Nitrogen from food scraps and waste will need to be supplemented with carbon from leaves or other sources. For every 1 part food scraps, 2 parts of leaves, woodchips or other carbon-rich materials should be added.

3. Decide how to contain the compost

- Before food waste is collected, ensure that you have a supply of leaves, dried grass, straw and other carbon rich "brown" materials. A collection can be held for faculty and residents to bring in their leaves each fall and grass clippings during warmer months. Designate a convenient drop-off location and decide how materials will be transported from the drop off area to the compost area.
- A leaf storage spot should be placed next to the compost area. Instead of keeping leaves in plastic bags, instead consider piling the leaves or building a low-cost wire fenced area.
- Leaves are bulky and may produce an eye sore to onlookers but planning for proper storage and maintenance of the leaf storage area to prevent complaints. Leaf bulk can be reduced by mowing the leaves.
- Ensure other sources of carbon are available if leaf and grass clipping stocks are depleted animal bedding, old straw or hay or shredded paper which can be placed in dry storage for this purpose.

The type and number of compost bins for your school may depend on the volume of food scraps from your cafeteria and your school's setting on the spectrum of urban, suburban, and rural areas.

- Commercial "home compost bins" may be used. Check with local solid waste officials to see if they sell them. Garden supply stores often carry compost bins.
- If bins are constructed, decide how materials will be collected and who will build them (perhaps a parent volunteer). Each individual compost bin should be at least 3 feet x 3 feet x 3 feet so that enough room is available for composting to occur.

- More resources on a variety of composting methods can be found on the [“How to Compost” website](http://www.howtocompost.org/cat_education.asp) at www.howtocompost.org/cat_education.asp

4. Equipment/supplies

Adding, turning, and aerating materials in bins will require a shovel and/or pitchfork. Schools that choose to use compost piles and windrows will find it easiest to turn materials and shape the piles with a small tractor with a bucket.

5. Cover the bin or pile

Make sure to have a piece of plastic or scrap carpet handy to provide cover in the winter and during heavy rains. This will not be an issue for purchased compost bins that come with lids.

6. Compost tasks

Distribute a delegated list of tasks to help keep compost functions going and prevent project “burn out”.

- Develop a schedule of compost operations and distribute tasks among willing students and faculty. A good distribution and rotation of tasks will keep helpers from becoming overburdened while allowing to learn different tasks.
- Cafeteria monitors are needed to ensure students are properly separating food waste and soiled paper. Younger students that may have difficulty with separating wastes can be helped by monitors.
- Remember to always start small and phase in the program and any changes that may occur once it is started. Flexibility is key! Modifications to the program may be needed to help it work best for your school.

More Information:

This information is adopted from the NERC, for more information, consult the NERC’s [Composting School Food Scraps and Soiled Paper](http://nerc.org/documents/composting_school_food_paper.pdf)
nerc.org/documents/composting_school_food_paper.pdf