# SCHOOL FOOD WASTE

## In-Vessel Composting and Anaerobic Digestion Guidance

Developed pursuant to N.J.S.A. 13:1E-99.115a

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**NJ DEPARTMENT OF ENVIRONMENTAL PROTECTION**
Air, Energy & Materials Sustainability
Division of Sustainable Waste Management

## Table of Contents

## A. GENERAL INFORMATION

According to the United States Environmental Protection Agency (EPA), "food loss and waste take up an area of agricultural land the size of California and New York combined" each year. Not only does this disposal consume vast amounts of land, but it also prevents valuable nutrients from returning to the soil. This wasted opportunity is compounded in landfills where food waste decomposes (rots) and produces greenhouse gases, further impacting public health and the environment. In fact, when food waste decomposes, it generates methane, a greenhouse gas which is "28 times as powerful as carbon dioxide at trapping heat in the atmosphere." Based on EPA estimates, 58% of methane emissions from landfills to the atmosphere are from food waste, making it a significant concern in terms of climate change. Proper management of food waste, through composting and anerobic digestion not only reduces greenhouse gas emissions to the atmosphere and waste disposed at landfills, but also produces products such as compost, renewable natural gas (RNG), and digestate for use as a soil amendment (solid fraction), and a liquid fertilizer (liquid fraction). (https://www.epa.gov/sustainable-management-food/sustainable-management-food-basics)

The following is an overview of the recycling technologies, the products generated from these operations, and the uses of those products:

**In-vessel composting system and compost**

An in-vessel composting system uses an enclosed building, container or other vessel to convert food waste and other organic material into a stable and nutrient-rich soil amendment or mulch (compost) through an aerobic decomposition process.

According to the EPA, finished compost can be added to gardens, tree and flower beds, blended with potting soil for indoor plants or spread in your yard on top of soil. Benefits of using compost include retention of nutrients and moisture in soil, sequestration of carbon in soil and reduction in potential for soil erosion. (https://www.epa.gov/recycle/composting-home)

**Anaerobic digestion system, biogas, and digestate**

An anaerobic digestion system is an enclosed system by which food waste or other organic material is converted into biogas, liquid digestate and solid digestate by use of microorganisms in the absence of oxygen.

Biogas is primarily composed of methane but also includes carbon dioxide, hydrogen sulfide, water vapor, siloxanes and other gases in trace amounts. Biogas can be used similarly to natural gas to generate electricity, heat and other uses. Biogas can be upgraded to remove impurities including carbon dioxide, hydrogen sulfide and siloxanes and produce RNG. The RNG can be injected into natural gas pipelines among other uses (https://www.epa.gov/agstar/how-does-anaerobic-digestion-work).

According to EPA, “digestate is the residual material left after the digestion process. It is composed of liquid and solid portions. These are often separated and handled independently, as each have value that can be realized with varying degrees of post processing.

With appropriate treatment, both the solid and liquid portions of digestate can be used in many beneficial applications, such as animal bedding (solids), nutrient-rich fertilizer (liquids and solids), a foundation material for bio-based products (e.g., bioplastics), organic-rich compost (solids), and/or simply as soil amendment (solids), the latter of which may include the farm spreading the digestate on the field as fertilizer. Digestate products can be a source of revenue or cost savings and are often pursued to increase the financial and net-environmental benefit of an AD/biogas project.” (https://www.epa.gov/agstar/how-does-anaerobic-digestion-work)

In an effort to reduce the public health and environmental impacts associated with food waste, and to encourage sustainable waste management practices, on December 21, 2023, Governor Murphy signed the School Food Waste Recycling Law (N.J.S.A. 13:1E-99.115a), herein referenced as “the law,” into effect. The law allows schools to collect food waste for on-site recycling through in-vessel composting and anaerobic digestion systems (AD) and also allows schools without on-site in-vessel composting and AD systems to transfer collected food waste to another school equipped with such systems. Schools that recycle food waste as described in the law are not required to obtain a permit or approval from the New Jersey Department of Environmental Protection (Department) under N.J.S.A. 13:1E-1 *et seq*., the Solid Waste Management Act or N.J.S.A. 13:1E-99.11 *et seq*., the New Jersey Statewide Mandatory Source Separation and Recycling Act to handle or process food waste on-site. Additionally, a school that composts or digests its own food waste may be subject to additional permits but will not be required to pay any fees to obtain permits for an on-site, in-vessel composting system or anaerobic digestion system pursuant to the "Air Pollution Control Act ," N.J.S.A. 26:2C-1 *et seq.*, the "Water Pollution Control Act," N.J.S.A. 58:10A-1 *et seq.*, any other State law, or any rule or regulation adopted pursuant thereto.

The law requires the Department to develop and issue guidance for these systems with respect to addressing odor control, vessel siting, operational standards, and recordkeeping. The law also requires schools that compost or digest food waste to submit a notification form to the Department (Appendix A).

This guidance document (guidance) is written in accordance with the law for operating food waste in-vessel composting or anaerobic digestion (recycling) in schools. Schools are encouraged to create and/or implement the following best management practices for recycling food waste.

## B. DEFINITION OF TERMS

**Anaerobically digestible**: means capable of undergoing anaerobic biological decomposition such that the material breaks down into a slurry fraction of digestate and a gaseous fraction of biogas.

**Anaerobic digestion system (AD)**: means a system of anaerobically digesting anaerobically digestible waste in which the waste is entirely enclosed, except for ventilation ducts or other means of ventilation, such that the material breaks down into, or otherwise becomes part of, liquid and solid digestate in addition to biogas.

**Compostable**: means capable of undergoing aerobic biological decomposition such that the material breaks down into, or otherwise becomes part of, usable compost in a safe and timely manner.

**In-vessel composting system**: means a system of composting compostable waste in which the waste is entirely enclosed, except for ventilation ducts or other means of ventilation, within a building, container, or other vessel.

**School**: means a public or nonpublic elementary or secondary school offering education in grades K through 12, or any combination thereof, at which a child may legally fulfill compulsory school attendance requirements.

## C. INITIAL ASSESSMENT

Before selecting an in-vessel composting and/or anaerobic digestion system (system), the school or schools in a district are encouraged to evaluate the current content and possible future expansion.

(1) The school may conduct an internal waste audit[1] of current disposal practices to determine the volume and content (mixture of unconsumed and post-consumed cafeteria-purchased and brown bag lunch (food waste)) with other non-compostable material.
(2) Based on the waste audit, the school can develop and implement a plan to improve the segregation of food waste and non-compostable materials.
(3) Next, estimate the food waste that will be generated.
(4) Based on the volume of food waste generated, the school is recommended to evaluate whether enough compostable material exists to conduct recycling operations and if there are resources available to conduct a recycling program that

[1] A waste audit is a formal, structured analysis of an organization's waste stream that enables one to determine what types of recyclable materials and waste one's office or facility generates and how much of each type is recovered for recycling or discarded. By using the data generated by a waste audit, organizations can identify ways in which they can reduce their waste generation, improve their recycling program and determine the potential for cost savings. https://www.nj.gov/

meets the requirements of the law, the "Air Pollution Control Act ," N.J.S.A. 26:2C-1 *et seq.*, the "Water Pollution Control Act," N.J.S.A. 58:10A-1 *et seq.*, any other State law, or any rule or regulation adopted pursuant thereto.

(5) The following resources for the measuring of food waste, conducting food waste audits and other topics including funding opportunities are available:
   a. Sustainable Jersey for Schools Toolkit (https://www.sustainablejerseyschools.com/fileadmin/media/resources/SJS_PreK-12_Food_Waste_Toolkit.pdf.)
   b. The State of New Jersey Food Waste Guidelines (https://dep.nj.gov/wp-content/uploads/sustainability/school-food-waste-guidelines/school_food_waste_guidelines_february_2024.pdf).
   c. The Department's Bureau of Sustainability Food Waste Toolkit (https://dep.nj.gov/sustainability/outreach-and-education/food-waste-toolkit/).

## D. SYSTEM SELECTION

After the initial assessment in C. above is complete, if the school will proceed on its own or collaborate with other schools, the school can research the available recycling system technologies and determine the system most suitable for its planned recycling operations. Criteria to consider include, but are not limited to:

(1) How much space is available to designate for use and implementation of the recycling system?
(2) Will site modification such as ground preparation or the construction of canopies or enclosures be required to accommodate the specific system? Be sure to check and comply with all applicable local and/or state requirements, regulations and ordinances regarding these modifications. Municipal construction and/or electrical permitting and inspections may be necessary. Contact your municipal construction permitting office for additional information.
(3) What is the volume of food waste generated?
(4) What is the budget for purchasing and operational expenses?
(5) Is any additional/special equipment needed to handle the receipt, storage, processing, and transfer of the food waste and the handling of the recycled products?
(6) How many staff/students are required to operate a specific recycling technology?
(7) What is the ease-of-use (accessibility, level of effort, etc.) and anticipated maintenance cost of the system?
(8) How or where can the compost generated be used?

## E. VESSEL SITING

It is recommended that the school's compost or AD system be sited in accordance with the criteria provided in this Section below.

(1) Compliance with local ordinances.

(2) Located as far as possible from the nearest sensitive receptor (e.g. classrooms, recreational areas, residences, etc.) to minimize odor and vector issues and meets local fire code.

(3) For verification of (2) above, the Department requests submission of an aerial photograph depicting the location be submitted via email to recyclingfacilities@dep.nj.gov.

## F. OPERATIONAL STANDARDS

To ensure that a school's composting or anaerobic digestion of food waste is conducted in a manner that is protective of public health and the environment, the Department recommends the following operational standards.

(1) A comprehensive Management and Contingency Plan prepared, maintained and updated as necessary. The plan can include:

a. Emergency Response Plan

i. Signs posted around the recycling operation with local fire police, emergency medical services (EMS), county environmental health agency (CEHA), school recycling emergency contact, school administrator, and school superintendent phone numbers.

ii. Fire Prevention and Control

1. School is recommended to develop a fire prevention and control plan that includes, but is not limited to:
    1. Fire extinguishers, sprinkler systems (if feasible and required), etc.
    2. Posting required signs.

2. The Fire Prevention and Control Plan is recommended to be submitted and approved by the local fire official.

b. Inclement and/or adverse weather conditions

i. Make sure all containers and the in-vessel system are secured in case of forecasted high winds.
ii. Temporarily suspend operations and divert food waste during high precipitation events (heavy rain or accumulating snowfall) until the area is made accessible.
iii. In the event of a power failure, shut down power supply to the system to prevent equipment failure from a power surge.

c. Leachate discharge

i. Develop a leachate inspection checklist and conduct daily inspections. As part of this inspection, check the integrity of the in-vessel system and the bins of collected food waste and repair/replace any as needed.
    1. Collect and properly dispose of the collected leachate.
    2. Thoroughly wash and clean affected area(s)

ii. The hauling of food waste can be conducted by staff trained by the school or by a transport company in a safe manner that avoids spillage on roadways and other areas not designated for the receiving, storage and processing of the material.

d. Equipment failure

i. Create a list of companies that can repair equipment and share with all responsible personnel.
ii. In case of equipment failure, where repair time exceeds a week, divert collected food waste and food waste to be generated during the time of repair to the nearest food waste recycler authorized by the Department. A list of authorized food waste recycling facilities can be found at: https://nj.gov/dep/dshw/food-waste-recycling-law/food-waste-recycle-facilities.html.

e. Odor complaints

i. Once complaint is received, verify if all containers are covered and no food waste is out of containers (i.e. on the ground).
ii. Verify any malfunctioning equipment.
iii. Confirmation that manufacturer's recommendations related to the mixture of food waste inserted and retention times were followed.

iv. Confirm that no unauthorized or non-recommended material was inserted into the process.

f. Litter control

i. Make sure container lids are secured and in operable condition.

ii. If high winds are forecast, make sure to add additional weight or security to the container lids to prevent release/dispersal of the container's contents.

g. Operator coverage

i. Ensure at least two back up personnel are trained to run the system and the recycling program.

h. Health and Safety

i. Operators should wear proper eye, ear and body protective equipment suitable for this type of operation.

ii. Implement proper OSHA technique for lifting, carrying and setting down heavy objects such as food waste or recycled product bins. Detailed OSHA recommendations can be found at: https://www.osha.com/blog/proper-lifting-techniques.

(2) A Sorting and Inspection Plan prepared, maintained and updated as necessary, for all incoming compostable and/or anaerobically digestible food waste (food waste) to meet the system's standards and be free from contaminants and non-compostable or non-anaerobically digestible materials.

a. It is recommended that this plan, at a minimum, include:

i. Segregating the compostable food waste (fruits, vegetables, biodegradable paper, etc.) that can be processed by the system, from contaminants (meats, dairy, fats, and non-compostable containers and packaging) in the cafeteria by the students/staff and depositing the food into the bins designated for food waste recycling, the other recyclable material into its bin, and lastly non-recyclable material into the garbage bin.

ii. Before food waste bins are removed from the cafeteria/building, it is recommended that they be visually inspected for any contaminants and, if any are found, they be removed and recycled or disposed in the garbage bin, as appropriate.

iii. Before placing food waste into the composting or anaerobic digestion system, the bins may be visually inspected again and any found contaminants are recommended to be removed to the recycling or garbage bin, as appropriate.

iv. All schools transferring food waste to another school with an on-site system may be required to follow the receiving school's Sorting and Inspection Plan upon request from the receiving school.

v. Students and staff trained by other staff, according to the Sorting and Inspection Plan, can ensure food waste is sorted and stored in the collection container intended for that type of food waste (e.g. solids or liquids), with an airtight lid, to minimize odor, water contact, vector attraction, and other nuisances.

(3) Odor control best management practices (BMPs) are recommended because while odors can simply be a nuisance to some, to others they can impact health/exacerbate underlying conditions like stress, elevated blood pressure, and/or asthma attacks. The BMPs below will assist with controlling odors. These BMPs can be found in the Department's Science Advisory Board, Final Report: Outdoor Food Waste Composting, found here: https://dep.nj.gov/wp-content/uploads/sab/sab-food-composting.pdf.

a. Waste Material Storage and Transport

vi. Cover collection/delivery vehicles should be covered and equipped with a leachate containment system.

vii. Make deliveries to an indoor space equipped with air pollution control equipment.

viii. Place food waste into composting bins on the day they are received. If receiving feedstock from other schools that is very odorous or wet, collection frequencies might need to be increased, and the feedstock will need to be processed more quickly.

ix. Develop good housekeeping practices such as cleaning spilled food waste from school roads, cleaning delivery vehicle's wheels and the loading areas before leaving the school.

b. Pre-processing

i. Sufficient amounts of the bulking agents should be available to avoid odorous leachate if the food waste feedstock is very wet.
ii. Cover any odorous materials left over from screening the feedstock.

c. Composting Process

i. Carefully control aeration rates, carbon and nitrogen balance (if necessary for systems), temperature, oxygen, and moisture.
ii. Limit material movements to when weather conditions are unlikely to carry odorous substances to off-site receptors.
iii. Ensure sufficient compost stability before compost is moved to post-processing.

d. Post-processing

i. Limit screening to times when weather conditions are unlikely to carry odorous substances to off-site receptors.

e. Leachate Management

i. Avoid any ponding of water in contact with organic material.

f. General Management Tools

i. Provide training for staff regarding procedures and maintenance that will minimize generation of odors, and regarding plans to address odor incidents expeditiously.

ii. Plan to regularly note any odorous conditions and immediately address them.

iii. Plan to respond to odor complaints.

iv. Lay out procedures for proper maintenance of bulking agent stockpiles and materials left over from screening.

v. Ensure that the facility capacity is not exceeded.

(4) The school's system operator(s) shall follow the manufacturer's instructions for processing food waste after it is transferred into the system from the collection containers.

(5) All schools shall ensure good housekeeping is maintained prior to the end of each working day. This includes, but is not limited to, cleaning collection containers, equipment and the operating pad.

## G. RECORDKEEPING

The school should maintain on-site records, that can be provided to the Department upon request.

(1) The school, on a daily basis, should record and maintain information including, but not limited to:

a. Amount of food waste generated on-site.
b. Amount of non-compostable material, generated on-site, recycled.
c. Amount of contaminants, generated on-site, disposed as garbage.
d. Amount of food waste received and name of the generating school.
e. Amount of food waste added to the system.
f. System readings, as made available by the system employed such as temperature, moisture content and oxygen content.
g. Amount of final product(s) (e.g. compost, digestate, biogas) generated.
h. End-market and use of final product(s).
i. Volume reduction calculations for each processed batch.

## H. COMPLIANCE WITH ALL LAWS AND REQUIREMENTS

Schools that wish to recycle food waste under this guidance must complete and submit the Notification Form (Appendix A) prior to conducting these activities. Submission of the form is a regulatory requirement.

Nothing contained in this guidance is intended or shall be construed to exempt any receipt, storage, processing and transfer of food waste or the use of final products from compliance with other applicable state, federal or local laws and regulations.

## I. CONTACT INFORMATION

Please contact NJDEP for any questions or concerns at:
Bureau of Recycling & Hazardous Waste Management
Phone: 609-984-3438
Email: recyclingfacilities@dep.nj.gov