NYC Solid Waste Management Plan 2026

Attachment A: Local Laws Relevant to Waste Management

This attachment summarizes New York City and State laws and regulations regarding waste, reuse, and recycling to provide the regulatory context for the *Draft 2026 Solid Waste Management Plan (Draft SWMP26)*. It also describes programs and initiatives in New York City that aim to reduce waste generation and increase reuse and recycling. Information on each law includes the year passed, year implemented, a brief overview, key components and/or notes, and stakeholders. Laws are organized by topic, waste type, and chronologically.

Information on relevant federal and international policy and trends is available in **Attachment D: National and International Factors Impacting Waste Management**.

Solid Waste Infrastructure and Management

Solid Waste Management Plans[1]

Year Passed	1972, Environmental Conservation Law (ECL) established 1976, Resource Conservation and Recovery Act (RCRA) enacted
Year Implemented	1987 (NYCRR Part 366)
Overview	In accordance with Section 27-0103[2] of New York's ECL and the federal RCRA[3], the New York State Department of Environmental Conservation (DEC) is required to prepare a Solid Waste Management Plan (SWMP) for the State. In accordance with Title 6 of New York Codes, Rules, and Regulations (NYCRR) Part 366 (6 NYCRR Part 366[4]), DEC requires Planning Units, including New York City, to prepare a Local Solid Waste Management Plan (LSWMP).
Key Components	› These plans require the planning unit to evaluate existing solid waste management practices; evaluate options for future solid waste management; provide projections for solid waste generation and reduction; consider alternatives for waste reduction, reuse, and recycling; and identify plan implementation steps. › Municipalities and other Planning Units are required to submit biennial LSWMP updates to DEC. › New York State's 2021 Senate Bill S6334[5] amended the law to require that Local Solid Waste Management Plans aim to increase waste diversion, such as recycling and composting. The amendment went into effect immediately after being passed in 2021.

	› The most recent State SWMP, *Building the Circular Economy Through Sustainable Materials Management (2023-2032)*, was completed in 2023, updated from the SWMP published in 2010. › The most recent LSWMP for New York City was completed in 2006 and expires in October 2026.
Stakeholders	› DEC and New York State Planning Units, City agencies, residents, businesses, institutions, waste haulers, and waste management facilities

New York State's Solid Waste Management Act of 1988[6]

Year Passed	1988
Year Implemented	1988; compliance with recycling and source-separation requirements was mandated by 1992.
Overview	The Solid Waste Management Act of 1988 established the State's Solid Waste Management Policy[7] and supports municipal implementation of the State's 1987 Solid Waste Management Plan.
Key Components	› Established the State's Waste Management Hierarchy (prioritizing waste prevention and reduction over forms of recycling or disposal). › Set expectations and reporting requirements for municipal waste management. › Requires municipalities to implement source-separation and recycling programs for paper and, since 1990, "all other waste for which recycling is a viable economic option."
Notes	› The State's long-term goal is to reduce waste disposal to 0.72 pounds per person per day by 2050 by maximizing waste reduction, improving recycling and resource recovery, and significantly reducing the amount of waste destined for management in a municipal waste combustor or for disposal at landfills. The State's 2010 SWMP included the goal of reducing waste to 0.6 pounds per capita daily by 2030.
Stakeholders	DEC and municipal governments, City agencies, residents, businesses, institutions, and waste management businesses and facilities

New York Codes, Rules, and Regulations: DEC - Subchapter B. Solid Wastes[4]

Year Passed	1987 (6 NYCRR Part 360)
Year Implemented	1987 (Part 360); updates implemented in 2023
Overview	› Holds waste facilities in New York State to standards described in NYCRR Part 360,[8] with regulations for specific facility types included in additional sections of Subchapter B.[9]

	› Requires all waste transporters in New York State to be registered or permitted by the State and abide by conditions specified in 6 NYCRR Part 364[10] and 6 NYCRR Part 381.[11]
Key Components	General waste facility standards described in Part 360 include the following: › Facility construction or expansion may not be conducted in a manner that poses threats related to wetlands, endangered species, or special flood hazard areas. › Facilities must keep daily logs of received and exported waste by waste type, quantity, origin, and destination. Facilities must submit annual reports to the State to certify compliance with applicable laws and regulations. › Engineering documents must be signed by engineers with active, valid State licenses and registrations. › Laboratory tests and/or analyses must be completed by laboratories certified by the State to perform those tests/analyses. › DEC personnel may inspect facilities and facility documents with or without notice. Noncompliance may result in permit or registration withdrawal. › Waste may be diverted from disposal and is no longer considered solid waste when it meets the State's definition of a beneficial use as specified in §360.12[12] and §360.13.[13] › Facilities must operate under the terms of their permit or registration and all applicable laws and regulations. › Facilities must institute and enforce a waste control plan supported by a staff training program. Waste and leachate must not enter ground or surface water, and leachate, dust, vectors, odor, and noise must be controlled. Only authorized waste may be accepted, and any incidents of unauthorized waste acceptance must be included in annual reports. › Environmental monitoring services may be required depending on location, potential damage to public or environmental health, and environmental compliance history. › Facilities must create a plan and estimate costs for closure and post-closure care, which shall be updated annually and have supporting financial assurance mechanisms.
Notes	Much of the solid waste generated in New York City is managed outside of New York State. For material that is exported out of state, additional and/or different local rules and regulations may apply. Other states where New York City Department of Sanitation (DSNY) sends waste include New Jersey, Pennsylvania, Virginia, South Carolina, and Ohio. Information regarding out-of-state or international exports of commercial and other privately managed waste generated within New York City is limited.
Stakeholders	Waste transporters, transfer facilities, processing facilities, and municipal governments

Local Law 39 of 1989[14]

Year Passed	1989
Year Implemented	1993
Overview	This law banned privately owned waste incinerators in New York City, requiring owners of incinerators to cease operations and seal or remove the equipment.
Note	The majority of units were small incinerators located in residential buildings.
Stakeholders	Residents, businesses, and institutions operating incinerators; DSNY

The Converted Marine Transfer Stations (MTS) Program[15]

Years Implemented	2006-2019
Overview	› Established the use of marine transfer stations (MTS) to provide the City with more long-distance waste disposal options and reduces truck traffic from on-road waste hauling.
Notes	The *2006 Solid Waste Management Plan (2006 SWMP)* focused on developing the MTS program. Planning for the MTS program began prior to the *2006 SWMP*. All MTSs determined to be necessary were built and operating by 2019, completing the program. Use of MTSs is ongoing.
Stakeholders	DSNY, residents

Local Laws 131,[16] *134,*[17] *and 135*[18] *of 2018*

Year Passed	2018
Year Implemented	2018
Overview	› Increased fines for littering and the improper or unlawful disposal/dumping of waste. › Increased fines for the owners of vehicles used to unlawfully or improperly dispose of waste.
Stakeholders	Potential offenders, New York City residents, and businesses

Local Laws 137[19] and 138 of 2018[20]

Year Passed	2018
Year Implemented	2018
Overview	› Increased penalties and penalty enforcement for littering from a vehicle. › LL138 requires DSNY to identify areas where littering from vehicles is common, determine how many violations occur in each district, and to take additional steps to enforce penalties.
Stakeholders	DSNY, potential offenders, New York City residents, and businesses

Local Law 148 of 2023[21]

Year Passed	2023
Year Implemented	2023
Overview	Requires the City to develop and update an urban forest plan with the goal of equitably expanding the urban forest canopy.
Key Points	› Required a designated City agency, the Mayor's Office of Climate and Environmental Justice (MOCEJ), to develop an urban forest plan by July 31, 2025, to equitably increase the City's tree canopy across public and privately owned land. › Requires updates to the plan every 10 years. › Requires other City agencies to collaborate with MOCEJ to promote the expansion of New York City's urban forest. › Could be leveraged to promote recovery of wood waste and the use of mulch and compost.
Stakeholders	MOCEJ, New York City agencies

New York City Containerization (Bin) Requirements[22]

Year Implemented	2024
Overview	To promote pest reduction, New York City mandated the use of trash bins for curbside refuse collection beginning in 2024. Official New York City trash bins are available for order on New York City's website.[23]
Key Components	› As of November 12, 2024, properties with 1-9 residential units must use bins, 55 gallons or less, with secure lids for trash set out. › Beginning in June 2026, all properties with 1-9 residential units will be required to use the official NYC Bin for trash set out.
Stakeholders	DSNY, residents; City agencies; nonprofits; houses of worship; professional offices in residential buildings that receive DSNY collection

Local Law 14 of 2025[24]

Year Passed	2025
Year Implemented	2028; 2032
Overview	Amends Section 16-316.1 of the administrative code, which required DSNY to conduct waste characterization studies due in 2012 and 2018, to require additional waste characterization studies.
Key Components	› A citywide multi-season waste characterization study of DSNY-managed residential and institutional waste streams is due by January 31, 2028. › A commercial waste characterization study including C&D debris is due by January 31, 2032.
Stakeholders	DSNY, Private waste carters, and businesses

Waste Equity

Environmental Justice for All Report[25] *(Local Law 60*[26] *and Local Law 64*[27] *of 2017)*

Year Passed	2017
Year Implemented	2024
Overview	› LL60 of 2017 mandated a study to identify environmental justice areas, concerns, and options for the City to address equity concerns. › L64 of 2017 requires the City and City agencies to identify and address environmental justice issues. To this end, it mandates the creation of an interagency working group.
Key Components	› Sanitation, waste management, access to recycling and composting collection services, and the presence of hazardous wastes are identified as environmental justice concerns related to solid waste.
Notes	› The *Environmental Justice for All Report* (EJ Report), developed by the Mayor's Office and New York City Environmental Justice Advisory Board, and resulting agency actions, will fulfill the requirements of LL60 and LL64.
Stakeholders	City agencies, including DSNY; New York City residents; and businesses

Local Law 152 of 2018 (Waste Equity Law)[28]

Year Passed	2018
Year Implemented	2019
Overview	Addressed disproportionate truck traffic and waste volume handled in overburdened community districts (Brooklyn Community District 1, Queens Community District 12, and Bronx Community Districts 1 and 2)
Key Components	• Reduced the permitted capacity of transfer stations in four community districts identified as overburdened. • Requires the prevention of "overconcentrated" waste management facilities and operations in community districts. • Requires DSNY to monitor waste flows and transfer station capacity and submit annual implementation reports to City Council.
Notes	The Law does not specifically address waste prevention or reduction, but it does provide some exemptions for tonnage limitations when the material being transferred is destined for recycling or other resource recovery.
Stakeholders	DSNY, transfer stations operators, and New York City residents

Community Hiring Initiative (2023 N.Y. Laws Ch. 669)[29]

Year Passed	2023
Year Implemented	2024
Overview	Established the Community Hiring Initiative and the Office of Community Hiring and Workforce Development (OCH), aiming to increase economic opportunities for low-income individuals and individuals living in economically disadvantaged regions.
Key Components	• Aims to reduce income disparity and promote economic security for economically disadvantaged individuals and regions. • Includes requirements for City vendors to make a best effort to provide employment and apprenticeship opportunities to low-income individuals and individuals who live in low-income communities. • Requires contractors and subcontractors to agree to publicly disclose employment opportunities. • Requires OCH to develop a procedure to certify economically disadvantaged candidates or economically disadvantaged region candidates. • Established a network of referral sources managed by OCH to connect City vendors with certified candidates.
Notes	Community hiring rules went into effect in January, 2025.[30] Community Hiring supersedes the former workforce development initiative, HireNYC.
Stakeholders	City vendors, City agencies, and residents

Waste Prevention and Sustainability

New York City and New York State have various programs, initiatives, and planning documents addressing waste reduction and sustainability in the waste sector. The following are some of New York City's waste reduction and reuse programs.

- DonateNYC[31] is the City's primary program for material donation and waste prevention. It is an online network run by DSNY to help city residents, organizations, and businesses donate clothing, food, equipment, and a variety of other supplies. Nonprofits and residents may receive donated goods.
- Materials for the Arts: NYC's Creative Reuse Center[32] takes donations of art materials and various goods for reuse by nonprofits, City agencies, and schools, providing opportunities for community activities and engagement.
- The Sanitation Foundation[33] (formerly known as the Foundation for New York's Strongest, Inc.) is the official nonprofit organization of DSNY. It aims to support DSNY workers and advance New York City's zero-waste initiatives through public engagement and education.
- DSNY Textile Recycling[34] is a free, in-building textile collection service for New York City residents, businesses, schools, and nonprofits. It is run by DSNY through a contracted partner.
- In prior years, donateNYC and the Sanitation Foundation organized Refashion Week,[35] a week-long engagement event that showcased sustainable fashion and textile reuse in the city.

New York State Climate Leadership and Community Protection Act (CLCPA)[36]

Year Passed	2019
Year Implemented	2019/2022
Overview	The CLCPA, per which DEC adopted 6 NYCRR Part 496, Statewide Greenhouse Gas Emission Limits,[37] limits the emission of GHGs by 2030 and 2050 as a percentage of 1990 emissions. The rule established 410 million metric tons of carbon dioxide equivalent emissions (million metric tons CO_2e) as the 1990 baseline, and, per the CLCPA, the State committed to the following requirements: › 40% GHG emissions reduction from the 1990 baseline level by 2030 (60% of 1990 emission levels, which equates to 246 million metric tons CO_2e) › 85% GHG emissions reduction from the 1990 baseline level by 2050 (15% of 1990 emission levels, which equates to 61 million metric tons CO_2e) › The CLCPA also establishes a goal of net zero emissions across all sectors of the economy by 2050 (the remaining 15% achieved through GHG emissions offset projects).
Key Components	› A scoping plan (published in 2022) and subsequent updates outline the recommendations for attaining the statewide GHG emissions limits. › Requires reporting on statewide GHG emissions and emission reduction measures from all sources in the state, including waste management facilities. › Provides guidance for calculating the social cost of carbon.

	› Requires DEC to implement a community air monitoring program and publish air quality data.

Notes	Pursuant to State climate goals, the *2022 Scoping Plan* outlined the following strategies related to waste management:
	› Reduce, reuse, and recycle waste via:
	  › Organic waste reduction and recycling
	  › Waste reduction, reuse, and recycling
	  › EPR/product stewardship
	  › Wastewater recovery resource facility (WRRF) conversion
	  › Refrigerant leak reduction and destruction
	› Monitor, detect, and reduce fugitive emissions and co-pollutants from:
	  › Solid waste management facilities
	  › WRRFs
	› Establish markets for recovered resources (recycling markets) and biogas utilization

Stakeholders	DSNY, city agencies, state departments

OneNYC[38] and PlaNYC[39]

Year Implemented	*PlaNYC: Getting Sustainability Done: 2023* *OneNYC 2050*: 2019 *PlaNYC: A Greener, Greater New York*: 2007
Overview	› New York City aims to achieve carbon neutrality by 2050, as detailed in the 2019 *OneNYC 2050* report. Waste accounts for approximately 4% of the City's GHG emissions. › The first PlaNYC report was released in 2007 and established requirements for sustainability planning in New York City. Annual updates were released from 2007-2014. *PlaNYC: Getting Sustainability Done* was released in April 2023 as a roadmap for the City to accomplish climate and sustainability goals.
Key Components	A variety of sustainability initiatives were identified in *PlaNYC*, including the following waste-related initiatives: › Reduce emissions from City agency food purchases by 33% by 2030. › Launch citywide curbside organics collection by 2024. › Expand commercial organics separation requirements to all food businesses by 2026. › Leverage existing DEP infrastructure to process collected organics into biogas and compost within the city as much as possible. › Expand the production and use of recycled asphalt.

	› Expand New York City Department of Parks and Recreation's (Parks) tree wood reuse pilot. › Expand the Clean Soil Bank program by 2030.
Stakeholders	DEP, DSNY, Parks, Mayor's Office of Environmental Remediation (MOER), MOCEJ

Local Law 38 of 2010[40]

Year Passed	2010
Year Implemented	2011
Overview	Created a citywide textile reuse and recycling program.
Key Components	Established a collection bin program to recover, reuse, and recycle textiles. The law requires publicly accessible textile drop-off bins with labeling and reporting requirements.
Stakeholders	New York City residents, DSNY

Local Law 73 of 2013[41]

Year Passed	2013
Year Implemented	2016
Overview	Requires the City to reduce pollutants associated with municipal vehicle use.
Notes	DSNY has implemented this law through the innovative use of electric, hybrid, and alternative-fuel vehicles, as well as operational methods that reduce idling and emissions.
Stakeholders	City agencies and other entities that use vehicles on the City's behalf

Local Law 112 of 2021[42]

Year Passed	2021
Year Implemented	2022
Overview	› Required City agencies to report textile purchases and disposal from 2018-2022. › Established a task force to assess City agency purchase and disposal/recycling of textiles, project agency textile needs, and develop environmentally preferable purchasing guidelines.
Stakeholders	City agencies, DSNY

Local Law 17 of 2023[43]

Year Passed	2023
Year Implemented	2023
Overview	› Prohibits food service establishments and food delivery platforms and couriers from providing utensils, extra containers, napkins, and condiment packets unless requested by customers. › Requires DSNY to assess the amount of single-use items in the waste stream in its future waste characterization studies.
Stakeholders	Food service establishments, food delivery platforms, couriers, customers, and DSNY

Local Law 86[44] *and Local Law 87*[45] *of 2023*

Year Passed	2023
Year Implemented	2023
Overview	› Requires DSNY to establish the goal of diverting citywide-generated recyclable waste by 100% by Calendar Year 2030 from landfills and/or incinerators. If this is determined to be infeasible despite the best efforts of City government, DSNY shall report this in their annual zero waste report and make recommendations on meeting this diversion goal. › Amends items in Sections 16-305, 16-307, 16-308, 16-310, and 16-316 of the administrative code of the city of New York to include diversion reporting requirements as part of the annual zero waste report (replacing the annual recycling report). Also repeals Subdivision K of Section 16-305, which detailed requirements for the annual recycling report.
Stakeholders	DSNY

New York State Executive Order (EO) 22 of 2022[46]

Year Passed	2022
Year Implemented	2022
Overview	› Requires State agencies, authorities, and other "affected entities" to adopt ambitious sustainability and decarbonization programs. › Created the GreenNY Council to oversee program implementation.
Key Components	Among other requirements related to electricity use and transportation, EO22 requires: › A decrease in waste disposal of 10% every five years from a 2018-2019 fiscal years baseline until reaching a goal of 75% reduction › A plan to phase out single-use plastics
Notes	Affected entities (State agencies and authorities) are required to assign an employee to serve as a sustainability coordinator and oversee implementation of GHG reduction and climate actions.
Stakeholders	State agencies and authorities

Commercial Waste

The Business Integrity Commission (BIC)[47]

Year Implemented	2001
Overview	› Formed when the Trade Waste Commission (formed by LL42 of 1996[48]) was combined with the Markets Division at Small Business Services and the Gambling Commission via a charter revision. › Works to eliminate organized crime and corruption from New York City businesses, including in the private waste sector.
Key Components	BIC responsibilities include: › Monitoring private carters › Setting and enforcing citywide rate caps on hauling services › Enabling fair competition
Stakeholders	Private carters and businesses

Local Law 145 of 2013[49]

Year Passed	2013
Year Implemented	2013, with compliance required by 2019
Overview	Mandated that all heavy-duty trade waste hauling vehicles be equipped with the "best available retrofit technology" for the reducing particulate matter emissions.
Notes	The law is enforced by BIC and benefits New York City residents by improving air quality.
Stakeholders	Private waste haulers, BIC

Local Laws 196,[50] *198,*[51] *and 199*[52] *of 2019*

Year Passed	2019
Year Implemented	2019
Overview	› Established Commercial Waste Zones (CWZs) in New York City to address overlapping routes that resulted in concerns about road safety, efficiency, staff working conditions, air quality, and noise pollution in the management of commercial waste. › Tasks BIC and DSNY with implementing and monitoring CWZs.
Key Components	› The laws created 20 nonexclusive geographical zones, each of which may be served by three to five private carters. › Carters compete for contracts to serve the zones, and contracted carters must abide by operating and reporting standards specified in the contracts. › The City has the right to remove the business permit or registration for carters that do not demonstrate compliance with standards and regulations. › LL198 of 2019 gives BIC the authority to enforce environmental, health, and safety standards for private waste businesses. › LL196 of 2019 was created to legally require global positioning systems in trucks used by carters contracted as part of the CWZ plan. Carters are required to comply with data reporting requirements by providing data generated by the GPS systems. This allows the City to monitor routing and assess reductions in mileage and emissions.
Notes	› On January 30, 2024, DSNY announced the list of contract awardees online.[53] Awards were granted to three carters for each CWZ. › The first commercial waste zone rollout (phase 1) was fully implemented in January 2025 in the Queens Central zone, allowing DSNY to engage in extensive outreach and education efforts and assess implementation and operational needs. › Bronx East and Bronx West zones (phase 2) will be fully implemented in November 2025.

	› From November 2025-December 2027, CWZ program rollout will be fully implemented for the remaining zones in phases 3-10.
Stakeholders	Private waste haulers, BIC, DSNY

Commercial Recycling

For more information on commercial recycling rules and regulations, see **Attachment G: New York City Commercial Recycling Rules**.

Local Law 87 of 1992[54]

Year Passed	1992
Year Implemented	1992
Overview	› Mandates recycling by businesses and buildings that have their waste collected by a private carter or recycler. › Mandates reporting by businesses that receive DSNY waste collection but choose to receive private collection of recyclables.
Stakeholders	Businesses and private carters

Local Law 32 of 2010[55]

Year Passed	2010
Year Implemented	2012
Overview	Mandated the completion of a commercial recycling study to facilitate waste reduction and increase waste diversion.
Key Components	Components of the study proposed in the law include: › A computer-based model used to gauge waste composition and capture rates › A review of current practices and operations › Recommendations for further analysis
Notes	The *New York City Commercial Solid Waste Study and Analysis* was completed in 2012.
Stakeholders	DSNY, commercial waste generators

Recycling Rules for New York City Businesses[56]

Year Passed	2016
Year Implemented	2017
Overview	In 2016, DSNY's simplified rules for commercial recycling went into effect with a one-year warning period before enforcement began.
Key Components	› Requires separation and recycling of metal, glass, some plastics, and paper. › Requires separation and recycling of textiles and yard/plant waste if these materials make up over 10% of a business's waste. › Requires separation of organics by large establishments.
Notes	Additional separation and recycling requirements have been established by subsequent laws.
Stakeholders	Businesses and commercial waste carters

DSNY-Managed Recycling and Reuse

DSNY manages recycling for residents and some City agencies and institutions. Rules for recycling managed by DSNY are posted on the NYC 311 website.[57] General recycling laws are listed below, while requirements for specific materials are included in the *Special Wastes and Extended Producer Responsibility (EPR) Laws* and *Food, Yard, and Other Organics Waste* sections of this memorandum.

Local Law 19 of 1989[58]

Year Passed	1989
Year Implemented	1989
Overview	Established the citywide mandatory recycling program for residents, institutions, and businesses.
Stakeholders	DSNY, New York City residents, institutions, and businesses

Local Law 34 of 2010[59]

Year Passed	2010
Year Implemented	2010, with program developed by 2011
Overview	› Created a recycling education program and publicly available guide on reuse, recycling, and composting. › Increased enforcement of recycling programs.
Notes	The education program was primarily focused on engagement with residents but also applied to institutions receiving DSNY recycling services.
Stakeholders	DSNY, New York City residents, schools, nonprofits, and City agencies

Local Law 36 of 2010 - Agency Recycling Plans[60]

Year Passed	2010
Year Implemented	2010, with reports due beginning in 2012
Overview	Requires City agencies to create waste prevention, reuse, and recycling plans and submit annual implementation reports.
Stakeholders	City agencies

Local Law 40 of 2010[61]

Year Passed	2010
Year Implemented	2010, with various components of the law executed from 2010-2012 and diversion reporting ongoing
Overview	Introduced to increase recycling rates and reporting.
Key Components	› Set yearly recycling percentage goals for DSNY-managed waste, with the goal of 33% in 2020. › Requires DSNY to release annual reports on the quantity of certain collected, diverted, and recycled materials, some of which are not DSNY-managed. › Mandated the completion of a 2012 waste characterization study and a study to explore economic factors and the feasibility of expanding recycling and composting in New York City.
Stakeholders	DSNY

Local Law 41 of 2010 – Recycling Plans in Schools[62]

Year Passed	2010
Year Implemented	2010, with plans due by 2011 and reports due beginning in 2012
Overview	Requires City agencies to create waste prevention, reuse, and recycling plans and submit annual implementation reports.
Key Components	› Directs the Chancellor of the Department of Education to designate a sustainability director to set policies, guidelines, and goals to promote waste prevention, reuse, and recycling. › Requires a site-specific waste prevention, reuse, and recycling plan for each school and other New York City Public Schools (Schools) building. › Directs the principal of each school to designate a sustainability coordinator to implement the waste prevention, reuse, and recycling plan.
Stakeholders	New York City Public Schools; private, independent, and religious schools with DSNY service, and DSNY.

Local Law 49 of 2017[63] and New York City Housing Authority Recycling

Year Passed	2017
Year Implemented	The program feasibility study[64] was conducted and released in 2018.
Overview	Required New York City Housing Authority (NYCHA) and DSNY to explore the feasibility of voluntary recycling incentive pilot programs in City public housing to address low recycling rates.
Notes	› NYCHA and DSNY launched the NYCHA Recycles! program in 2015 to encourage recycling in public housing. › By the end of 2016, all NYCHA developments were added to DSNY recycling routes and provided with recycling bins and educational materials.
Stakeholders	NYCHA residents, NYCHA employees, and DSNY

Local Law 88 of 2023[65]

Year Passed	2023
Year Implemented	2023-2024
Overview	› Required the establishment of at least two community recycling centers in each borough to be operational by December 31, 2024. › Requires DSNY to host at least one recycling event in each community district annually.
Stakeholders	DSNY, New York City residents

Special Waste and Extended Producer Responsibility (EPR)

Many materials must be handled with special care during disposal and should not be disposed of with other waste due to potential environmental and health hazards. These wastes include hazardous household waste (HHW), regulated medical waste (RMW), electronics, and various other materials. Product stewardship programs and EPR laws[66] require that manufacturers accept and handle the disposal of used product waste or otherwise bear responsibility for waste products. Some City and State special waste handling requirements and EPR laws are described below. Some types of waste are also covered by federal legislation (e.g., universal waste).

New York State Environmental Conservation Law (ECL)—Prevention and Control of Environmental Pollution by Radioactive Materials (NYCRR Part 380) [67]

Year Passed	1974
Year Implemented	1974; major revisions in 1994 and 2018
Overview	› Outlines standards for the handling, transport, and disposal of radioactive material and waste such that it is appropriate for the protection of public health. › Applies to anyone who may be in a position to release radioactive material into the environment, even by accident, and to anyone who utilizes or otherwise disposes of or releases radioactive material into the environment.
Key Components	› Limits the radiation dose to which members of the general public may be exposed. › Requires a permit for release of radioactive materials directly into the environment. › Requires exposure to radiation in uncontrolled environments to be kept as low as possible.
Stakeholders	Anyone responsible for handling radioactive waste

New York State ECL Article 23, Title 23[68]

Year Passed	1979
Year Implemented	1979
Overview	Requires businesses that service vehicles and sell over 500 gallons of oil per year, or any business that sells more than 1,000 gallons of oil per year, to accept used oil from consumers.
Key Components	Businesses must safely store the used oil before sending it for processing and submit annual reports to DEC.
Stakeholders	Businesses

New York State 1982 Bottle Bill,[69] *Returnable Container Act (EPR)*

Year Passed	1982
Year Implemented	1983
Overview	Incentivizes the return of beverage containers to the beverage distributor or dealer via a 5-cent deposit per container, which is included in the price of purchase and paid back to the consumer upon return.
Notes	This rule is under revision as of September 2025.
Stakeholders	Beverage distributors and consumers

New York State Hazardous Waste Law (NYCRR Title 6, Chapter IV, Subchapter B, Parts 370-377)[70]

Year Passed	1985
Year Implemented	1985; last amended in 2023
Overview	Established a hazardous waste management system to control hazardous waste from generation to disposal.
Key Components	› Subpart 374-3,[71] established in 1998 and last amended in 2023, allows certain types of hazardous waste, including batteries, lamps, mercury-containing equipment, aerosols, paint, and some pesticides, to be handled by universal waste transporters and destination facilities
Stakeholders	Hazardous waste generators and handling facilities, consumers, and retailers

New York State Lead-acid Battery Recycling Law[72]

Year Passed	1990
Year Implemented	1991
Overview	Requires retailers and distributors of lead-acid batteries to accept and recycle used batteries. It also prohibits consumers from disposing of batteries in the trash.
Key Components	› Distributors must accept up to two used lead-acid batteries per month from any individual at no charge. › Distributors must accept used lead-acid batteries from any retailer to which the distributor sells lead-acid batteries at no charge
Stakeholders	Battery retailers, distributors, and consumers

New York State Laws on Mercury Containing Products[73]

Year Passed	6 NYCRR Parts 364, 370, and 317: 2002 N.Y. Environmental Conservation Law Chapter 43-B, Article 27, Title 21: 2004 Mercury Thermostat Collection Act: 2013
Year Implemented	6 NYCRR Parts 364, 370, and 317: 2006 N.Y. Environmental Conservation Law Chapter 43-B, Article 27, Title 21: 2005 Mercury Thermostat Collection Act: 2014
Overview	Require manufacturers to phase out mercury-containing products and dispose of them properly.
Key Components	› 6 NYCRR Parts 364, 370, and 317[74] address mercury use at dental facilities. › ENV Chapter 43-B, Article 27, Title 21[75] addresses mercury-added consumer products, including fluorescent lamps. › Mercury Thermostat Collection Act[76] addresses EPR for mercury thermostats.
Stakeholders	Manufactures, consumers, and municipalities

New York State Waste Tire Management and Recycling Act[77] *(Environmental Conservation Law: Article 27, Title 19)*[78]

Year Passed	2003
Year Implemented	2003
Overview	Requires facilities that sell tires to take back and dispose of old tires for a small fee. It also requires DEC to abate noncompliant waste tire stockpiles to avoid environmental concerns.
Stakeholders	Facilities that sell tires, DEC, and consumers

New York State Wireless Telephone Recycling Act (Environmental Conservation Law: Article 27, Title 23)[79]

Year Passed	2007
Year Implemented	2007
Overview	Requires cell phone service providers who sell mobile phones to provide free reuse and recycling services for up to 10 cell phones from any person, or to provide free shipping of phones to a recycling program.
Stakeholders	Consumers and phone service providers

New York State Rechargeable Battery Law[80] (Environmental Conservation Law, Article 27, Title 18) [81]

Year Passed	2010
Year Implemented	2010
Overview	Requires retailers and distributors of rechargeable batteries to accept and recycle used batteries. It also prohibits consumers from disposing rechargeable batteries in the trash.
Stakeholders	Retailers, distributors, and consumers of rechargeable batteries

New York State Electronic Equipment Recycling and Reuse Act[82]

Year Passed	2010
Year Implemented	2011
Overview	Requires manufacturers to provide “free and convenient” electronics recycling for individuals and small businesses (large businesses may be charged).
Notes	Supersedes Local Law 13 of 2008.
Stakeholders	Manufacturers, small businesses, and residents

New York State Drug Take Back Act[83]

Year Passed	2019
Year Implemented	2019
Overview	Requires prescription medication manufacturers to create and fund drug take-back programs for the safe collection and disposal of unused medications covered by the act. Pharmacies with ten or more locations in New York State, or pharmacies outside of the state that provide covered drugs to New York residents, must participate in implementation. The New York State Department of Health approves proposals for take-back programs.
Stakeholders	Prescription medication manufacturers and wholesalers, pharmacies, and consumers

New York State Paint Stewardship Program (NYCAC § 16-310.2) [84]

Year Passed	2019
Year Implemented	2019
Overview	› Facilitates city compliance with the New York State Postconsumer Paint Collection Program. › Requires the DSNY commissioner to provide guidance to assist affected entities in collecting or reclaiming paint products.
Stakeholders	DSNY, paint producers, and consumers

New York State Postconsumer Paint Collection Program[85] *(ECL Article 27, Title 20)* [86]

Year Passed	2019
Year Implemented	2022
Overview	Requires producers of architectural paint, which includes house paint and primers, stains, deck and concrete sealers, and clear finishes, to implement a post-consumer paint collection program. The program created drop-off sites funded by “PaintCare fees” incorporated into the price of paint, which reduces municipal costs of handling.
Stakeholders	Paint manufacturers and consumers

New York State Digital Fair Repair Act[87]

Year Passed	2022
Year Implemented	2023
Overview	Requires original equipment manufacturers to make diagnostic and repair information for digital electronic parts and equipment available to independent repair providers and consumers, if such parts and repair information are also available to original equipment manufacturers authorized repair providers and servicers.
Notes	› The bill passed by the state legislature was amended before being signed into law with additional exemptions including motor vehicles, home appliances, farm equipment, and medical devices. › This was one of the first right-to-repair bills in the United States.
Stakeholders	Electronic equipment manufacturers, repair technicians, and residents

New York State Carpet Collection Program Law[88]

Year Passed	2024
Year Implemented	2026
Overview	› Requires producers of carpet, including broadloom carpet, modular carpet tiles, artificial turf, pads or underlayment utilized with carpet, as well as other types of carpet, to provide a convenient program to collect carpet waste. Disposal of these products must come at no cost to consumers. › Bans the sale of carpets containing or treated with PFAS substances by December 31, 2026, thereby reducing the amount of PFAS in the subsequent waste stream.
Key Components	Producers are required to submit a carpet collection program plan to the DEC and to achieve a 75% recycling rate (40% closed loop) 15 years after the original program plan is approved by the DEC.
Notes	Handmade rugs, area rugs, and mats are exempt from this legislation.
Stakeholders	Carpet producers, DEC, and DSNY

New York State Medical Waste Legislation

Since the 1980s, DEC and the New York State Department of Health (DOH) have overseen the disposal of medical waste. Regulated medical waste (RMW) includes cultures and stocks; human pathological waste, including blood; used or unused needles and syringes (sharps); animal waste; and "any other waste materials containing infectious agents designated by the Commissioner of Health as regulated medical waste."[89] Regulations include NYCRR Title 10, Subchapter 1, Parts 370-374 and 376. Additional RMW regulations include:

› Section 70-2.1[90] of New York State Code requires facilities producing RMW to create a plan for its treatment and disposal. Any facility that generates 50 or more pounds of RMW per month and treats the waste off-site must use a waste transporter permitted by DEC. Section 70-2.1 affects facilities generating RMW, waste transporters, and RMW-handling facilities. On-site treatment must comply with the rules specified in New York Code Section 70-2.3.[91]

› The Occupational Safety and Health Administration (OSHA) requires that sharps be placed in a puncture-resistant container and autoclaved or decontaminated before reuse or disposal.[92]

› Consolidated Laws of New York, Chapter 45 ("Public Health"), Article 13 ("Nuisances and Sanitation"), Section 1389-CC address disposal guidelines for sharps. Section 1389-CC affects facilities generating RMW. Sections 1389-DD(3) and (4) address private disposal of sharps either via pilot programs or to hospitals and health care facilities. Section 1389-DD affects residents, hospitals, and healthcare facilities.

› RMW containing or mixed with hazardous materials, including radioisotopes or toxic drugs, must be labeled and collected separately in accordance with New York Code 70-2.2.[93]

New York City Special Waste Laws

Local Law 39 of 2010: Household Hazardous Waste Collection Law[94]

Year Passed	2010
Year Implemented	2010
Overview	Established a household hazardous waste (HHW) collection program in New York City, creating SAFE Disposal[95] collection events and Special Waste Drop-Off Sites[96] in each borough.
Stakeholders	Residents

Local Law 69 of 2013: Refrigerants[97]

Year Passed	2013
Year Implemented	2014
Overview	Created a manufacturer-funded EPR program for collection of refrigerant-containing appliances to recover ozone-depleting and other refrigerants from residential waste.
Notes	› In 2015, New York City Administrative Code (NYCAC) §16-485[98] was amended to charge a fee to manufacturers for appliances recovered in curbside collection. was amended to charge a fee to manufacturers for appliances recovered in curbside collection. › DSNY currently provides free residential curbside removal of appliances including refrigerators, freezers, air conditioners, water coolers, and dehumidifiers.
Stakeholders	Residents, manufacturers, and DSNY

Local Law 81 of 2023: Donation of surplus computer equipment[99]

Year Passed	2023
Year Implemented	2023
Overview	Requires the Department of Citywide Administrative Services (DCAS) to donate surplus computer equipment to eligible organizations.
Notes	› Eligible organizations include public schools, public libraries, other public or private educational institutions, and a nonprofit institutions serving persons with disabilities, senior citizens, or low-income individuals. Donations may not be used for religious worship, instruction, or proselytizing. › Required DCAS to establish rules that will determine how recipient organizations may be prioritized. Eligible organizations must provide a plan describing how the equipment will be used. › If no eligible organization submits a plan for equipment use within one year, DCAS may auction or dispose of surplus equipment. › DCAS must submit annual reports containing information on donations.
Stakeholders	DCAS, eligible organizations

Best Management Practices (BMPs) for All Non-Residential Dischargers of Fat, Oil, and Grease to the Public Sewer System (New York City Rule §19-11)[100]

Year Passed	2021
Year Implemented	2021
Overview	Requires commercial entities that use and dispose of fat, oil, and grease (FOG) to install grease interceptors or automatic grease removal devices in any drainage systems likely to receive FOG to prevent sewage build up according to best management practices. Commercial entities must comply with sizing requirements specified in the rule.
Key Components	› Exemptions to this requirement include sinks and drains that are exposed to minimal FOG as specified in rules. › Grease inceptors and grease removal devices must be installed by a New York City Licensed Master Plumber. › Yellow grease (waste cooking oil) disposal must be collected by a BIC-licensed carter, and proof of collection must be documented in writing.
Notes	BMPs were established prior to 2021 and amended in 2021.
Stakeholders	Businesses and commercial waste haulers

Other Materials Banned from Disposal and Subject to Special Collection

Friable asbestos and highly corrosive or flammable liquids should not be disposed of in the municipal waste stream. To reduce the risk of health and environmental hazards, the handling, recycling, and disposal of these materials is regulated by New York State[101] or New York City[102] laws, respectively.

Plastic Waste Reduction

The laws and executive orders summarized below apply to businesses and affect businesses and consumers. They aim to reduce the volume of commercial and residential plastic waste.

New York State Plastic Bag Reduction, Reuse, and Recycling (6 NYCRR Part 351)[103]

Year Passed	2019
Year Implemented	2020
Overview	› Bans the distribution of single-use plastic bags by anyone required to collect New York State sales tax. › Allows municipalities to charge consumers 5 cents per paper bag used.
Stakeholders	Businesses that collect New York State tax, municipalities, and consumers

Small Plastic Bottle Hospitality Personal Care Product Restriction (ECL Section 27-3203)[104]

Year Passed	2024
Year Implemented	2025-2026
Overview	› Bans hotels from providing customers with small, single-use plastic bottles containing personal care products. › Went into effect for hotels with 50 or more rooms on January 1, 2025. › Went into effect for hotels with less than 50 rooms on January 1, 2026.
Stakeholders	Hotels

Local Law 142 of 2013[105]

Year Passed	2013
Year Implemented	Determination of polystyrene recyclability: 2015 Ban on polystyrene: 2019
Overview	Required the City to determine whether single-use expanded polystyrene (foam) food service products could feasibly be recycled. If, by 2015, research showed that expanded polystyrene could not be recycled, the material would be banned for use in commercial businesses (particularly food service).
Notes	› The City determined that polystyrene cannot be recycled. › The ban on the use of expanded polystyrene for most commercial uses, as well as polystyrene loose fill packaging (packing peanuts), went into effect in 2019.
Stakeholders	Businesses (particularly food service) and consumers

Local Law 63 of 2016[106]

Year Passed	2016
Year Implemented	2016
Overview	› Included a number of measures to encourage reduction of single-use carryout bags.
Key Components	› Encouraged the use of reusable bags through public education. › Set standards for carryout bags provided by stores by requiring paper and plastic bags to contain specified amounts of recycled materials. › Required the city to report on single-use carryout bag reduction by 2018 › Requires stores to charge a fee of 5 cents for each carryout bag provided to customers. › Requires stores to allow customers to bring their own carryout bags.
Notes	The law prompted a study to determine the law's effect on residents and the potential effects of a plastic bag ban.
Stakeholders	Retailers and consumers

Local Law 100 of 2019[107]

Year Passed	2019
Year Implemented	2020
Overview	Integrated DEC's Plastic Bag Reduction, Reuse, and Recycling Law into New York City Code
Notes	This law has the potential to benefit recycling facilities, where plastic bags can disrupt operations by getting tangled in recycling equipment.
Stakeholders	Businesses and consumers

Local Law 64 of 2021[108]

Year Passed	2021
Year Implemented	2021
Overview	Restricts the use of single-use plastic straws, stirrers, and splash sticks.
Key Components	› Prohibits food service establishments from providing plastic stirrers and splash sticks to consumers but allows compostable stirrers and splash sticks. › Requires compostable straws to be used; plastic straws must be made available only upon request.
Stakeholders	Food service establishments and their customers

Local Law 35 of 2024[109]

Year Passed	2023
Year Implemented	2024
Overview	Requires sports venues to allow event attendees to bring reusable beverage containers into the venue, with the stipulation that venues may limit containers to 24 ounces and require attendees to empty the containers.
Stakeholders	Sports venues and their customers

Executive Order 42 of 2019, Eliminating the Use of City Funds for the Unnecessary Purchase of Single-Use Plastic Foodware[110]

Year Passed	2019
Year Implemented	2019; reporting requirements began in 2020
Overview	Enacted to eliminate the use of City funds for the unnecessary purchase of single-use plastic foodware, such as forks, spoons, knives, and straws.
Key Components	› Required plans from each agency to eliminate unnecessary purchases of single-use plastic foodware. › Requires annual reports on implementation.
Stakeholders	City agencies, Mayor's Office of Contracting Services (MOCS)

Executive Order 54 of 2020, Eliminating Unnecessary Single-Use Plastic Bottles[111]

Year Passed	2020
Year Implemented	2021 (reporting requirements)
Overview	Enacted to reduce the use of single-use plastic beverage bottles.
Key Components	› Required agencies to develop a plastic bottle reduction plan by June 30, 2020, and phase out all unnecessary plastic bottle use and purchases by January 1, 2021. › Aimed to eliminate any unnecessary expenditure of City funds for the purchase of single-use plastic beverage bottles in favor of reusable options determined eligible by the City. › Aimed to eliminate the unnecessary sale of single-use plastic beverage bottles on City-owned and -leased properties. › Required agencies to report on the progress of single-use plastic beverage bottle reduction in the annual *Agency Waste Prevention, Reuse, and Recycling Plan* submitted to DSNY.
Stakeholders	City agencies, DSNY, and MOCS

Construction and Demolition (C&D) Waste

New York State regulates New York construction and demolition (C&D) haulers and facilities.

State Facility Regulations

Facilities handling C&D waste may be permitted or registered. Standards for C&D waste management facilities are available in Subpart 361-5[112] of the Codes, Rules, and Regulations of the State of New York.

NYCRR Parts 360-366 and 369[113] were updated in 2023. Revisions include the following:

- Part 360: Defines beneficial uses for various materials and establishes criteria to help determine when a nonspecific facility permit is needed rather than a beneficial use determination (BUD). Also defines fill reuse types and allowable uses.
- Part 361: Identifies permits, registration, exemptions, and requirements for facilities managing concrete, asphalt pavement, rock, or brick (CARB); recyclable material; compost and mulch; and soil/fill produced by C&D.
- Part 362: Adjusts previous rules to encourage diversion of food waste, recycling, and waste paint.
- Part 363: Enhances requirements for landfill liners for various types of landfills. Also requires horizontal gas collection lines for C&D landfills.
- Part 364: Modifies transport requirements to expand exemptions for C&D and waste tires.
- Part 365: Changes RMW handling requirements and registration options.
- Part 366: Moves submission of biennial SWMP updates from May 1 to October 1.
- Part 369: Clarifies grant reimbursement terms.
- Part 371: Defines “solid waste” and includes waste produced by oil and natural gas processes in the definition of hazardous waste.

New York State Environmental Conservation Law, Chapter 43-B, Title 27[114]

Year Passed	2019
Year Implemented	2020
Overview	Increased penalties for unlawful dumping.
Key Components	› Added requirements (Chapter 43-B, Article 27, Title 31)[115] for cities with a population of 1 million or more to track the movement of construction waste. Waste transporters in applicable areas must track C&D waste types and amounts in waste-tracking documents, and waste receivers must confirm, sign, and maintain the documents.
Stakeholders	C&D waste haulers and facilities and municipalities with a population of 1 million or more, including New York City.

Local Law 71 of 2011[116]

Year Passed	2011
Year Implemented	2015
Overview	Requires asphalt concrete used for City streets and sidewalks to contain a minimum of thirty percent reclaimed asphalt pavement.
Key Components	› Asphalt concrete containing a higher proportion of reclaimed asphalt pavement is encouraged. › If there is not a sufficient supply of reclaimed asphalt pavement available, the commissioner may waive this requirement › If a project is governed by a federal or state law, rule, regulation, guideline, or specification that requires a different composition for asphalt pavement, it is exempt from this requirement.
Stakeholders	City agencies, NYCDOT, construction sector

New York City Clean Construction Executive Order 23[117]

Year Passed	2022
Year Implemented	Action plans were due by October 1, 2023.
Overview	Aimed at reducing emissions associated with C&D waste.
Key Components	Requires capital project agency construction managers to: › Submit environmental product declarations for some concrete and structural steel materials. › Attempt to use low-carbon concrete. › Attempt to use low-emission or fully electric vehicles and equipment. › Submit action plans to reduce embodied carbon associated with their projects.
Notes	Indirectly affects C&D waste characteristics and potentially tonnage.
Stakeholders	Construction sector

Food, Yard, and Other Organic Wastes

Organic waste comprises a significant amount of New York City's waste stream. Food, yard waste, and other organic material can be redirected from landfills and incinerators by donation, composting, anaerobic digestion, and other efforts.

Curbside organics collection became mandatory and available citywide in 2024. There are also leaf drop-off sites[118] and food scrap drop-off sites.[119] DSNY also conducts seasonal leaf collections[120] and collects Christmas trees each January. The State and local laws and initiatives that affect and encourage organic waste diversion in New York City are summarized below.

New York State Food Donation and Food Scraps Recycling Law (6 NYCRR PART 350)[121, 122]

Year Passed	2019
Year Implemented	2022
Overview	Requires businesses that generate an annual average of two tons of wasted food per week or more to donate excess edible food and recycle all remaining food scraps if they are within 25 miles of an organics recycler (e.g., composting facility or anaerobic digester). This law does not apply to New York City.
Stakeholders	Businesses, excluding hospitals, nursing homes, adult care facilities, and farms

Source Separation of Yard Waste and Commingling of Organic Waste (NYC Administrative Code Sections 16-305 & 16-308)[123]

Year Passed	2023
Year Implemented	2023-2024
Overview	› Requires the separation of yard waste from other wastes to divert yard waste from being sent for disposal. › Requires designated storage space and appropriate containers for yard waste at buildings with four or more residential units.
Stakeholders	DSNY, residential building owners, and residents

Local Law 37 of 2010 [124]

Year Passed	2010
Year Implemented	Between 120 days and 24 months after enactment
Overview	› Requires the City to accept residential and agency yard waste for composting, either at City-owned or privately-owned facilities, with the goal of establishing at least one composting site per borough. › Mandates that composting facilities annually report the volume of organic waste they receive.
Key Components	› Source-separation, collection, and composting of DSNY-managed yard waste, except that generated by the New York City Department of Parks and Recreation (Parks).
Stakeholders	Residents, agencies, and composting facilities

Local Law 77 of 2013[125]

Year Passed	2013
Year Implemented	2013; mandated expansion of the pilot was implemented in 2015
Overview	Established a voluntary residential curbside organics collection pilot program and a school organics collection pilot program.
Stakeholders	Residents, schools, the NYC Compost Project, and the NYC Composting Council (a DSNY-facilitated group of community compost site managers, compost educators, urban farmers, and other stakeholders)

Local Law 146 of 2013[126]

Year Passed	2013
Year Implemented	2015
Overview	Established commercial organic waste handling requirements for large establishments that serve or distribute food.
Key Components	Allows the DSNY Commissioner to determine that some or all establishment types must have their food waste diverted from landfill or incineration.
Notes	This law was updated and integrated into the New York City Administrative Code (Title 16 NYCAC, Section 16-301) in 2020.
Stakeholders	Large establishments that serve food, including distributors, retailers, restaurants, arenas, and hotels

Local Law 176 of 2017[127]

Year Passed	2017
Year Implemented	2017, with the portal expected to be in use within 18 months of enactment
Overview	Required the creation of a web portal to facilitate food donations from commercial food producers to recipients.
Notes	The web portal, donateNYC,[128] serves as a resource for commercial donors and donation recipients.
Stakeholders	New York City Department of Information Technology and Telecommunications (DoIT)

Local Law 22 of 2019[129]

Year Passed	2019
Year Implemented	2019
Overview	Established a curbside organics collection pilot program for 15 or more City-owned or special-use institutional buildings in multiple boroughs and required a report on the program in 2021.
Notes	The law went into effect immediately, and the pilot continued through 2021.
Stakeholders	City agencies and City-owned buildings receiving curbside organics collection

Local Laws 40[130] *and 41*[131] *of 2020*

Year Passed	2020
Year Implemented	2020
Overview	Required the City to create a 10-year food policy plan and an Office of Food Policy to reduce hunger, promote access to nutritional food, improve urban agriculture and food/farm economies, and reduce food waste.
Stakeholders	Mayor's Office, DSNY, organizations and institutions working on food policy and access and residents

Local Law 57 of 2021[132]

Year Passed	2021
Year Implemented	2022, with annual reports beginning October 2022
Overview	Requires New York City agencies to create a food waste prevention plan that establishes methods to prevent, reduce, and donate surplus food. It also requires each agency to produce annual reports and designate a coordinator to implement food waste prevention plans.
Stakeholders	City agencies with large food purchase contracts

Local Law 65 of 2021[133]

Year Passed	2021
Year Implemented	2021
Overview	Requires the chancellor of New York City Public Schools to create a food waste prevention plan to identify, reduce, and donate surplus foods and reduce food waste.
Stakeholders	New York City schools

Local Law 85 of 2023[134]

Year Passed	2023
Year Implemented	2024
Overview	Required DSNY to create a mandatory residential curbside organics collection program available to all City residents by October 7, 2024.
Stakeholders	Residential building owners and residents

Local Law 89 of 2023[135]

Year Passed	2023
Year Implemented	2024
Overview	Required the establishment of at least 30 organic waste drop-off sites throughout the city, with at least three in each borough in operation no later than April 1, 2024.
Stakeholders	DSNY

Local Law 18 of 2024[136]

Year Passed	2024
Year Implemented	2024
Overview	Requires DSNY to remove branches, vegetation, and fallen tree limbs obstructing streets and sidewalks as a result of severe weather.
Stakeholders	DSNY

Local Law 118 of 2024[137]

Year Passed	2024
Year Implemented	2024
Overview	Established requirements for the creation of composting facilities in City parks. Requires the creation of additional composting facilities in five parks in each borough by July 1, 2028. Facilities are required to prepare annual reports detailing their composting processes.
Stakeholders	DSNY, Parks

Labor and Safety Laws

Creating and enforcing labor and safety standards is crucial for successful solid waste management. Local laws on sanitation labor and safety are summarized below.

Local Law 56 of 2015[138]

Year Passed	2015
Year Implemented	2015, with vehicle compliance by 2024
Overview	Required side guards on large vehicles in the City's fleet and on trade waste vehicles to reduce pedestrian injuries and deaths.
Stakeholders	DSNY, private waste haulers, and pedestrians

Local Law 55 of 2019[139]

Year Passed	2019
Year Implemented	2019
Overview	Requires trade waste labor unions and organizations to register with BIC and provide data on union or organization officers, including criminal or civil convictions, investigations, or pending actions involving officers.
Key Components	› The commission may disqualify an officer who has been convicted of crimes directly related to the trade waste industry, racketeering, or organized crime. › Registration is valid for five years.
Notes	Local Law 84 of 2021[140] clarifies that registration and enforcement are applicable to putrescible trade waste handling.
Stakeholders	Trade waste labor unions, organizations, and workers; waste management organizations

Local Law 56 of 2019[141]

Year Passed	2019
Year Implemented	2019
Overview	Mandates that licensed and registered trade waste haulers display information on workers' rights. This information is also required to be available online through BIC.
Stakeholders	Trade waste businesses and workers.

Local Law 57 of 2019[142]

Year Passed	2019
Year Implemented	2019
Overview	Addresses trade waste hauler labor and wage violations by requiring BIC to report violators to city, state, or federal law enforcement agencies.
Stakeholders	Trade waste workers and waste management entities

Endnotes

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55 http://nyc.legistar1.com/nyc/attachments/2fa2a924-a987-40ec-91a4-0b9288345541.pdf
56 https://www1.nyc.gov/assets/dsny/docs/commercial-recycling-notice-english.pdf
57 https://portal.311.nyc.gov/article/?kanumber=KA-02013
58https://codelibrary.amlegal.com/codes/newyorkcity/latest/NYCadmin/0-0-0-221527
59 http://nyc.legistar1.com/nyc/attachments/790245a2-4808-4474-a28a-b47f33108927.pdf
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62 https://intro.nyc/local-laws/2010-41
63 http://nyc.legistar1.com/nyc/attachments/5eb042ff-9498-4759-8c69-0efc620bb612.pdf
64 https://dsny.cityofnewyork.us/wp-content/uploads/2018/07/2018-06-LL49-Report_Final.pdf
65 https://intro.nyc/local-laws/2023-88
66 https://www.dec.ny.gov/chemical/66746.html
67 https://dec.ny.gov/regulatory/regulations/summary-of-express-terms-6-nycrr-part-380
68 https://www1.nyc.gov/nycbusiness/description/new-york-state-motor-oil-regulations
69 https://www.dec.ny.gov/chemical/8500.html
70https://govt.westlaw.com/nycrr/Document/I4eac9d06cd1711dda432a117e6e0f345?contextData=%28sc.Default%29&transitionType=Default&bhcp=1
71 https://extapps.dec.ny.gov/docs/materials_minerals_pdf/3743fulltextregs.pdf
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80 https://www.dec.ny.gov/chemical/72065.html
81 https://www.nysenate.gov/legislation/laws/ENV/A27T18
82 https://www.nysenate.gov/legislation/laws/ENV/A27T26
83 https://www.health.ny.gov/professionals/narcotic/drug_take_back.htm
84 https://nycadmincode.readthedocs.io/t16/c03/sch02/#section-16-310-2
85 https://www.dec.ny.gov/chemical/120606.html
86 https://www.nysenate.gov/legislation/laws/ENV/A27T20
87 https://www.nysenate.gov/legislation/bills/2021/A7006
88 https://dec.ny.gov/environmental-protection/recycling-composting/carpet
89 https://regs.health.ny.gov/content/section-70-12-definitions
90 https://regs.health.ny.gov/content/section-70-21-waste-management-plan
91 https://regs.health.ny.gov/content/section-70-23-treatment-and-disposal
92 https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1030
93 https://regs.health.ny.gov/content/section-70-22-containment-and-storage
94 http://nyc.legistar1.com/nyc/attachments/d0dc32ff-8e49-4f96-be31-ba1ce5b9213b.pdf
95 https://www1.nyc.gov/assets/dsny/site/services/harmful-products/safe-disposal
96 https://www1.nyc.gov/assets/dsny/site/services/harmful-products/special-waste-drop-offs
97 http://nyc.legistar1.com/nyc/attachments/1e00d8d9-6890-43af-9ed2-3f1003b0474d.pdf

98 https://nycadmincode.readthedocs.io/t16/c4-E/
99 https://intro.nyc/local-laws/2023-81
100 https://codelibrary.amlegal.com/codes/newyorkcity/latest/NYCrules/0-0-0-27198
101https://dec.ny.gov/environmental-protection/waste-management/solid-waste-types/household-hazardous-waste; https://dec.ny.gov/environmental-protection/waste-management/solid-waste-types/construction-demolition-debris/asbestos
102https://www.nyc.gov/site/dsny/collection/get-rid-of/harmful-household-products.page
103 https://www.dec.ny.gov/chemical/50034.html
104 https://www.nysenate.gov/legislation/laws/ENV/A27T32
105https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=1444213&GUID=71AB91E9-EC77-47F0-B904-4D4B4A607568&Options=ID%7cText%7c&Search=142
106 http://nyc.legistar1.com/nyc/attachments/8cf88822-8d14-48e7-b86c-9fc927ac5c68.pdf
107 http://nyc.legistar1.com/nyc/attachments/0e9b014b-d6db-49a9-97dc-caa1ef3abfee.pdf
108 http://nyc.legistar1.com/nyc/attachments/0e9b014b-d6db-49a9-97dc-caa1ef3abfee.pdf
109 intro.nyc/1161-2023
110 https://www.nyc.gov/assets/mocs/downloads/Regulations/exec-order-42/Executive_Order_42_Single_Use_Plastics_Signed.pdf
111 https://www.nyc.gov/assets/dsny/downloads/services/agencies-nonprofits/executive-order-54-2020-single-use-bottles.pdf
112 https://www.dec.ny.gov/docs/materials_minerals_pdf/part360propfulltext360series.pdf
113 https://www.dec.ny.gov/regulations/118777.html
114 https://www.nysenate.gov/legislation/laws/ENV/A71T27
115 https://www.nysenate.gov/legislation/laws/ENV/27-3101
116 https://intro.nyc/local-laws/2011-71
117 https://www.nyc.gov/content/dam/nycgov/mayors-office/downloads/pdf/executive-orders/2022/eo-23.pdf
118 https://www1.nyc.gov/assets/dsny/site/services/food-scraps-and-yard-waste-page/community-leaf-drop-off
119https://www1.nyc.gov/assets/dsny/site/services/food-scraps-and-yard-waste-page/nyc-food-scrap-drop-off-locations
120 https://www1.nyc.gov/assets/dsny/site/services/food-scraps-and-yard-waste-page/leaf-and-yard-waste
121 https://www.dec.ny.gov/chemical/114499.html
122 https://dec.ny.gov/regulatory/regulations/adopted-part-350-food-donation-and-food-scraps-recycling
123https://www.nyc.gov/assets/dsny/downloads/about/adopted-rules/dsny-final-rule-mandatory-yard-waste-separation-organic-waste-commingling-063023.pdf
124 http://nyc.legistar1.com/nyc/attachments/b43abac3-83ff-417e-972c-7475f55e06f0.pdf
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128 https://www.nyc.gov/assets/donate/site/home
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134 https://intro.nyc/local-laws/2023-85
135 intro.nyc/0281-2022
136 intro.nyc/0145-2022
137 https://intro.nyc/local-laws/2024-118
138 http://nyc.legistar1.com/nyc/attachments/8a3edce5-adc4-4f2b-b905-1b7ce9b5539d.pdf
139 https://www1.nyc.gov/assets/bic/downloads/pdf/regulations/local-law-55-2019.pdf
140 http://nyc.legistar1.com/nyc/attachments/08df660c-d8c3-4155-9882-ba7334e1778d.pdf
141 https://www1.nyc.gov/assets/bic/downloads/pdf/regulations/local-law-56-2019.pdf
142 https://www1.nyc.gov/assets/bic/downloads/pdf/regulations/local-law-57-2019.pdf

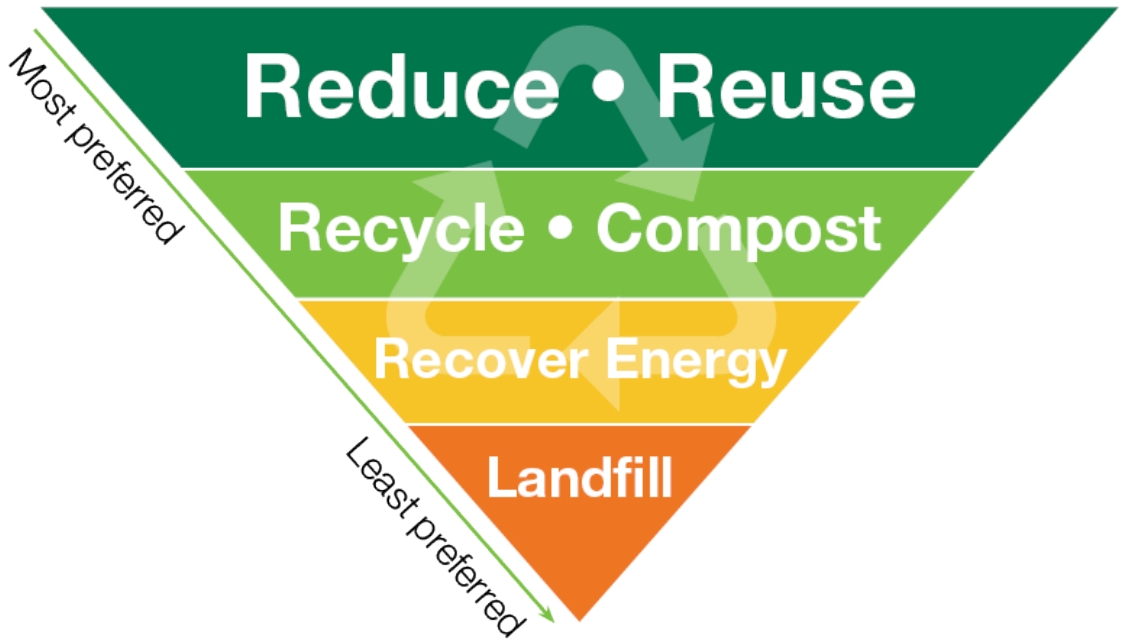
NYC Solid Waste Management Plan 2026

Attachment B: Existing Waste Reduction, Reuse, and Recycling Programs in New York City

This attachment discusses existing waste reduction, recycling, and reuse programs in New York City instituted by municipal, nonprofit, and private entities and provides an overview of waste reduction initiatives and practices that increase the recovery and reduce the disposal of materials in the context of the *New York City Solid Waste Management Plan (SWMP26)*. New York State's Environmental Conservation Law (ECL Section 27-0106) sets the State's solid waste management policy, which provides an ordered listing of preferred solid waste management methodologies. This hierarchy, in descending order of preference, is summarized below and illustrated in **Figure 1.**[1]

1. Reduce the amount of waste generated.
2. Reuse material for the purpose for which it was originally intended or recycle material that cannot be reused. (Within this document, composting and anaerobic digestion are considered forms of recycling.)
3. Recover, in an environmentally acceptable manner, energy from solid waste that cannot be economically and technically reused or recycled.
4. Dispose of solid waste that is not being reused or recycled, or from which energy is not being recovered, by land burial or other methods approved by the New York State Department of Environmental Conservation (DEC).

Figure 1. New York State Waste Management Hierarchy



According to the *New York State Solid Waste Management Plan,* the State's goal is to reduce waste sent to disposal facilities from 4.1 pounds per person per day of municipal solid waste (MSW) in 2010 to 0.6 pounds per person per day by 2030. Legislation as well as individual behavioral change and action are required for the success of the State's 2023 SWMP. Current New York State and New York City laws that affect solid waste management are summarized in **Attachment A: Local Laws Relevant to Waste Management**. New York City's Department of Sanitation (DSNY) capacity to enforce those laws is limited.[1]

DSNY's Role and New York City's History of Waste Reduction, Reuse, and Recycling

DSNY collects and accepts recyclables (metals, glass, plastic, cartons, paper, cardboard), organics (food scraps, yard waste, and food-soiled paper), hazardous waste (electronics, medical waste, flammables, and other hazardous household products), and nonrecyclable material (e.g., toiletries such as lotion, sanitary products, etc.) from residents, agencies, and institutions for waste disposal or diversion.[2]

New York City's curbside recycling program began in 1986 as a voluntary initiative for residents. Comprehensive recycling across the city was fully phased in by 1997.[3] In Fiscal Year 2024 (FY24)[i], collected 638,882 tons of recyclable material (paper, cardboard, metal, glass, plastic, and organics) through residential curbside and containerized recycling. Total DSNY-managed material collected for recycling in FY24 was 825,879 tons, which, in addition to curbside and containerized recycling, included tires, vehicles, and other recyclables collected by DSNY, by nonprofit and for-profit organizations that partner with DSNY, and through special waste collection events.[4]

DSNY has conducted waste characterization studies for residential and commercial waste and publishes annual waste reports for residential and public institutions (e.g., public schools and correctional facilities), reporting recycling and garbage tonnages and diversion rates.[5] The most recent residential waste characterization study[ii], conducted in 2023, describes the composition of municipal solid waste in New York City. The aggregate discards by percent in the 2023 study year were as follows:[6]

- Residential curbside recyclables: 32%
- Organics suitable for composting: 36%
- Other divertible materials: 7%
- Other materials: 25%

Of the designated residential recyclables, 51.2% was attributed to metals, glass, plastic, or cartons, and 50% was attributed to clean paper or cardboard.[6] DSNY collected and disposed of 3.2 million tons of refuse through landfills and incinerators and diverted approximately 20.6% of material through recycling and reuse programs in 2024.[4]

[i] The fiscal year for New York City agencies runs from July 1 of the previous year to June 30 of the year indicated. For example, Fiscal Year 2024 (FY24) is the period from July 1, 2023 through June 30, 2024.
[ii] Residential and/or institutional waste characterization studies were conducted in 1990, 2000, 2005, 2013, 2017, and 2023.

Waste reduction, reuse, and recycling programs contribute to the reduction of municipal solid waste sent to incinerators and landfills helping the city achieve the diversion goals mandated by Local Law 40 of 2010, reduce greenhouse gas emissions, and reduce waste management costs.[7, 8]

Definitions

Recycling. DEC defines "recycling" as the series of activities by which recyclables are collected, sorted, processed, and converted into raw materials or used in the production of new products, or, in the case of organic recyclables, used productively for soil improvement. This term excludes thermal treatment (other than anaerobic digestion) or the use of waste as a fuel substitute or for energy production, alternate operating cover[iii], or within the footprint of a landfill.[9]

- **Upcycling** is a form of recycling that requires the material to be improved or increased in value through the modification of the original product. Examples of upcycling include the creation of clothing from fabric scraps or the creation of reefs from leftover oyster shells.
- **Downcycling** is a form of recycling in which the product of the recycled item is of lower value than the original product. Examples of downcycling include the production of landfill cover from used vehicle tires or the production of insulation or carpeting from discarded fabric.

Reuse. "Reuse" is defined as the repeated use of an item or product for its original purpose. Reuse extends the life of a product and can include the resale of an item.[10]

Waste Reduction. "Waste reduction" is defined as the prevention of solid waste generation through changes in behavior, products, and purchasing. At the commercial level, waste reduction may include changing the design of goods to expand the lifecycle and or purchasing practices of goods, or altering the manufacturing process to minimize waste generation and toxicity. Waste reduction practices for individuals may include the rental or repair of products. DEC does not consider recycling a form of waste reduction.[11]

Reduction, Reuse, and Recycling Programs

This section describes reduction, reuse, and recycling programs in New York City and state, organized by type of waste:

- Organics
- Clothing and Textiles
- Metals, Plastics, and Glass
- Electronics
- Paper and Cardboard
- Construction and Demolition (C&D) Debris
- Harmful or Hazardous Waste
- Vehicles
- Furniture and Appliances

[iii] Alternate operating cover refers to the application of material atop landfills to reduce the unintended dispersal of litter.

- Specialty Recycling and Reuse Services

Recycling and reuse contribute to waste reduction. DSNY's donateNYC is the largest reuse platform specific to New York City, providing resources on donation and reuse of items for residents, nonprofits, schools, and businesses.[12] In addition to donateNYC, reuse platforms and practices include thrift and reuse stores, online platforms, and community gifting of used items. The variety of reuse practices and the informal nature of reuse make it challenging to quantify reuse. Data inconsistency can be attributed to how amounts are tracked (if at all) for various reuse programs and platforms, as well as the different units used by entities participating in the reuse sector. For instance, a clothing donation facility may track material by weight, whereas an electronics repair shop may quantify reuse by the number of items refurbished.[13]

It is also notable that the length of time many durable products are used has decreased, resulting in more electronics and appliances discarded, some before the end of their useful life.

donateNYC

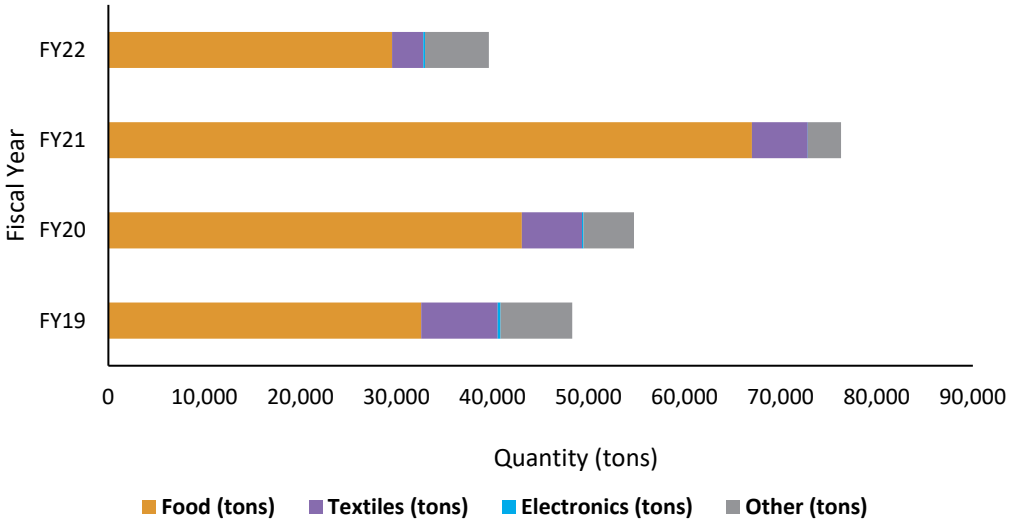
DSNY's Reuse & Donations unit advances New York City's waste diversion goals through the donateNYC online tools and nonprofit partnership, community events, and reuse research. donateNYC's tools include the Directory for residents looking to donate, find, repair, or borrow goods, the Exchange for businesses and nonprofits to donate or receive durable goods, and the Food Portal for businesses and nonprofits to donate or receive edible food. donateNYC was established in 2016 and updated in 2019 to include the Food Portal mandated by Local Law 176 of 2017.

The donateNYC Partnership includes over 30 nonprofits representing a broad cross section of reuse, such as thrift stores, food rescue, social services, and arts programs. By donating and reusing goods instead of discarding them, New Yorkers can greatly reduce waste, conserve energy and resources, save money, and help provide jobs and human services for New Yorkers in need. **Table 1** shows the number of donateNYC Partners by year and **Figure 2** shows the amount of donations by material and year. Additional organizations are members in the donateNYC reuse network, which does not require annual reporting or donateNYC meeting attendance that is required for Partners.

Table 1. Number of donateNYC Partners by Year

Fiscal Year	donateNYC Partners
FY19	28
FY20	39
FY21	31
FY22	33

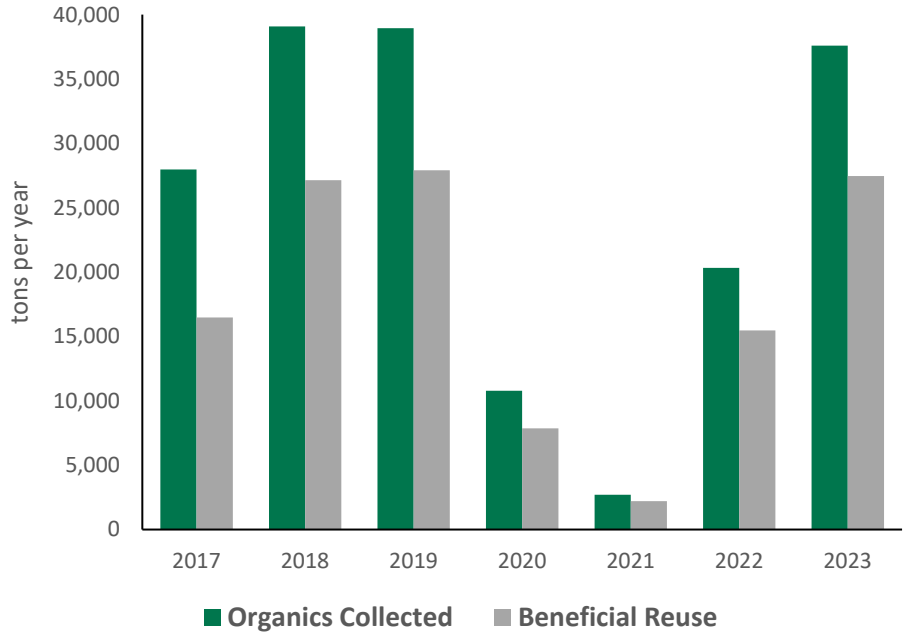
Figure 2. donateNYC Partner Donations by Material, Fiscal Years 2019 - 2022



Organics

Organics comprise approximately one-third of the city's residential waste stream and includes food (produce, meat, dairy, grains, and oils), plant matter (including leaves, yard waste, holiday trees, and houseplants), food-soiled paper, and certified compostable products.[6,14] Waste reduction of organics includes the rescue of edible food for consumption and the creative reuse of food scraps into valuable resources. Over the past decade, DSNY has been working to make organics recycling more convenient, and effective in New York City, despite limited funding and other challenges. **Figure 3** shows the amount of organic waste from residences and schools collected and reused by DSNY between 2017 and 2023. Tonnage increased annually until the start of the pandemic, when the organics collection program was suspended.

Figure 3. DSNY Curbside Collected Organic Waste and Beneficial Reuse by Calendar Year



In 2024, the Citywide Organics Program was fully implemented, which provides organics collection services to residents and schools. In FY24, 53,882.4 tons of organic waste were collected by DSNY's residential and school curbside collection program. (Calendar year 2024 beneficial reuse data was not available at the time of assessment for this *Draft 2026 SWMP*; therefore, 2024 data is not included in **Figure 3**.)[i] DSNY diverted an additional 2,159.2 tons of organic waste from Rikers Island.[iv,4 15] An additional 3,394 tons of organic waste were collected in FY24 through DSNY-funded programs, including GrowNYC Greenmarket and NYC Compost Project drop-off locations.[4] Information on small scale (including backyard and community) composting programs exist for some sites in the city; however, the quantity of material processed by these organizations is not included in the above amounts.

Certain commercial establishments that serve or distribute food are also required to separate organics for recovery, in accordance with Local Law 146 (LL 146) of 2013. Since the law's implementation, the number and types of venues that are required to collect organics for recycling have expanded.[16]

Organics management includes anaerobic digestion, biosolids processing and application, composting, chipping, food rescue, and creative reuse. Food rescue is the optimal destination for fresh, surplus food. Anaerobic digestion and composting are best for inedible food scraps and yard waste. Additional information on organics recycling can be found in **Attachment E: Organic Waste Generation and Management in New York City**.

Table 2 and **Table 3** summarize organics waste reduction, recycling, and reuse program data for some of the organics programs described in the following sections. **Table 3** includes information on programs that are no longer active under the names listed but had supported organics diversion through 2024.

[iv] Rikers Island correctional facility is scheduled to close in 2027.

Table 2. Summary of Organics Programs, FY 2023

Program	Program Type	Quantity (Tons)
Biosolids	Various Beneficial Reuse	292,520
Commercial Organics	Composting and anaerobic digestion	70,262**
DSNY Residential Curbside Organics	Compost and anaerobic digestion	32,773
DSNY Schools Curbside Organics Collection	Compost and anaerobic digestion	7,963*
donateNYC	Food Rescue	43,568
Plant, Leaf, and Yard Waste	Chipping and composting	3,023*
Private Landscaper Leaf and Yard Waste	Composting	26,509
Rikers Food Waste	Composting	2,181
Total		**478,799**

Sources: *2023 Annual Report NYC Municipal Reuse and Recycling Statistics, DSNY Commercial Waste: Quarterly Transfer Station Reports, DSNY – BRS Summary of Primary Program Tonnages Operated or Facilitated by DSNY FY 2019 – 2022 (September 2022), New York City Department of Environmental Protection (DEP) Wastewater Resource Recovery Facility Data.*

Notes:

1. Tons per day data were annualized using 312 pickup days for 2023 Commercial Organics.
2. * Indicates data is from FY 2022.
3. ** Indicates data is from calendar year (CY)

Table 3. Summary of Prior Organics Programs, 2019

Program	Program Type	Diverted (Total Tons)
Green Market Food Waste*	Composting and anaerobic digestion	1,600
NYC Compost Project	Composting	2,651
Total		4,251

Source: *GrowNYC Greenmarket 2019 Report, 2019 – 2020 SWMP Biennial Update: DSNY Solid Waste Management Plan.*

Notes:

1. *DSNY funded a portion of this collection.
2. Program data is provided from 2019 to indicate the full scope of program activities prior to the pandemic and funding challenges experienced in 2023 and 2024.

Anaerobic Digestion | Recycling

In anaerobic digestion micro-organisms and heat break down organic matter in the absence of oxygen to produce digestate and methane, also referred to as biogas. Methane can be combusted to provide a local source of energy. Anaerobic digestion, a form of thermal treatment, is discussed in more detail within **Attachment H: Review of Advanced Thermal Treatment Technologies**.

The New York City Department of Environmental Protection (DEP) Newtown Creek Wastewater Resource Recovery Facility (WRRF) was established in 1967 to treat wastewater and was renovated between 2010 and 2014 to also enable anaerobic digestion of food scraps.[17]

Organics that undergo anaerobic digestion are first blended into a slurry at Varick Avenue Transfer Station in Brooklyn and then transferred and processed at Newtown Creek WRRF.[18] In 2024, 186 wet tons per day (TPD) of food scraps were processed at the Newtown Creek facility.[19] The facility has the capacity to process up to 250 tons of food waste per day.[18]

Codigestion of food scraps and wastewater was first piloted at the Newtown Creek WRRF in 2016. Biogas and digestate are products of this process. Biogas can be used as a fuel source while biosolids can support soil fertilization

and provide landfill cover. Digestate produced at Newtown Creek WRRF is reused as landfill daily cover, beneficially reused, or are landfilled. In 2023, DEP fully rolled out the biogas-to-grid project, enabling biogas recovered at the WRRF to provide energy to over 5,000 homes.[20]

Biosolids

New York City's wastewater is treated at 14 WRRFs operated by DEP. Micro-organisms in WRRF digesters transform sludge (an intermediary product of wastewater treatment) into biogas and digestate. After digestion, the solid components of sludge are separated from the liquid components (dewatered). Only six WRRFs have onsite digestate dewatering capabilities. Those facilities without dewatering capabilities transport their digestate through force mains or marine vessels to in-city regional dewatering facilities.[21] After dewatering, the solids and/or biosolids output are disposed or reused through third-party contractors.

WRRFs in New York City produced 447,357 wet tons of biosolids in FY23. Approximately 35% of those biosolids were landfilled, and an additional 36% were composted. The remaining biosolids were managed using a combination of thermal drying (11%), alkaline stabilization reclamation for mining or agriculture (17%), and direct land application (2%).[22] DEP has a goal of zero-landfilling of biosolids by 2030, which will require reusing all biosolids beneficially. Technologies that can be used to qualify biosolids for reuse include composting, drying, and gasification or pyrolysis.[21] Gasification and pyrolysis are two forms of thermal treatment that are discussed in further detail in **Attachment H**.

DEP WRRFs also collect and manage grit, screenings, and scum from catch basin cleanings of the stormwater collection system and marine debris/floatables from New York City waterways. While reuse options for many of these materials are limited, DEP does see potential for grit and scum to be repurposed as part of long-term resource recovery efforts.[23]

Composting | Recycling

Microorganisms, bacteria, fungi, and insects break down organic materials to create compost. Heat and movement of the organic waste also contribute to the chemical and physical decomposition of material. Compost generated from these processes can be used to promote plant health, as the nutrients from the decomposition of organic materials are retained in the compost. Compost can replace synthetic fertilizers, conserve water by retaining soil moisture, and reduce methane emissions that would otherwise be produced from organics in landfills.[24]

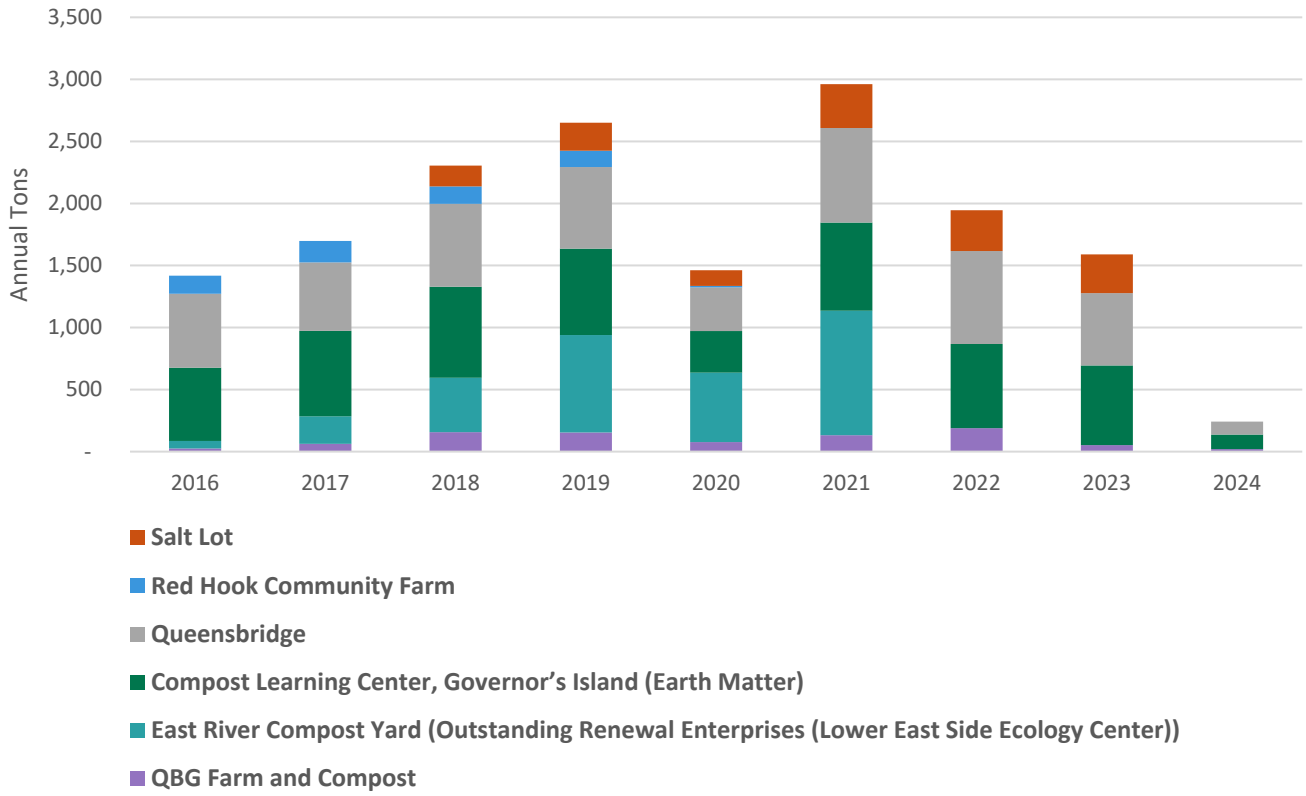
Residential and institutional composting programs across New York City's five boroughs include DSNY's Curbside Collections, Smart Compost Bins, GreenThumb, GreenCity Force, and Compost Power.[25, 26, 27] Compost produced by these programs supports public parks and green spaces or are redistributed to residents and community gardens.

The NYC Compost Project (NYCCP), which operated from 1993 to 2024, was a program funded by DSNY and in partnership with Big Reuse (Queensbridge Site and Gowanus Salt Lot), Brooklyn Botanical Garden (at Red Hook Farms, Columbia Street Farm), New York Botanical Garden, Earth Matter NY (Compost Learning Center, Governors Island), Lower East Side (LES) Ecology Center (East River Compost Yard), Queens Botanical Garden (QBG Farm and Compost), and the Snug Harbor Cultural Center and Botanical Garden. The East River Compost Yard closed in October 2021 and the Big Reuse Queensbridge site closed in June 2024. The Big Reuse Gowanus Salt Lot closed in February 2024, but will reopen in 2025. The program provided education, skills, and opportunities to produce and use compost locally. As of FY26, funding for community composting is provided through New York City Council and the program is managed by DSNY.

Mandates for commercial organics recycling resulted in close to 32,000 tons of material collected from commercial establishments for composting in 2019.[28] Based on voluntary and noncomprehensive commercial waste carter surveys, more than 70% of commercial organic waste is estimated to be processed outside of New York City. This is especially true for waste from restaurants.

The amount of compost collected by NYCCP partner organizations between 2016 and 2022 is illustrated in **Figure 4**. As shown, there was a steady increase from year to year in the amount of collected compost until the start of the pandemic. Amounts rebounded in 2021. The decrease shown in 2022 was largely due to the temporary closure of the LES Ecology Center (East River Compost Yard).

Figure 4. Amount of Compost Collected at NYC Compost Program Sites, 2016 - 2024



Chipping | Recycling

For woody material, such as timber and wood from construction, a more efficient alternative to composting is chipping, which requires less time for the material to be processed. Chipping produces mulch, which can provide soil enrichment for gardens and street tree beds.

MulchFest, a New York City Parks program, provides free chipping services for residents' holiday trees. In the 2021-2022 season, the program recycled over 50,600 trees.[29] DSNY also collects holiday trees curbside.[29, 30]

Food Rescue | Waste Reduction

Food rescues partner with restaurants and other food service retailers to redistribute fresh, excess food in the communities in which they work, addressing hunger with food relief and providing a more sustainable alternative to composting by reducing edible food waste.

In 2023, donateNYC partners redistributed 43,568 tons of food.[31] This amount does not include food rescued through online services or programs unaffiliated with donateNYC.[4]

The largest food rescue organization in the city, City Harvest is a nonprofit donateNYC Partner. Founded in 1982, City Harvest facilitates a program to provide New Yorkers with food while addressing food waste by NYC restaurants. In FY23, City Harvest, working with Community Partner Distribution sites[v], rescued 39.5 tons of food.[32]

Creative Reuse | Recycling - Upcycling

Creative reuse of organic waste for nontraditional purposes can support emissions reductions and habitat restoration and supplement nutrition. Examples of creative reuse include the production of plant-based leather from pineapple leaves and the creation of reefs from discarded oyster shells. Oyster reefs provide habitats that promote marine biodiversity, filter pollutants in waterways, and improve storm resiliency. The Billion Oyster Project, founded in 2018, serves all five New York City boroughs, reusing oyster shells from restaurants in local waterways to restore oyster reefs. The Billion Oyster Project collected 168 tons of oyster shells in 2022. Approximately 60 tons of oyster shells were deployed for reef restoration projects in the same year. As of March 2025, the Billion Oyster Project collected over 1,400 tons of shells.[33]

Clothing and Textiles

Clothing and textiles accounted for approximately 5% of the waste stream in 2023, based on the *2023 Residential Waste Characterization Study*.[6] In 2023, 1,704 tons of clothing and textiles were reused or recycled through donateNYC partner organizations.[10] In FY24, DSNY collections programs (including refashionNYC, partner nonprofits, and DSNY-sponsored events) and independent collections by nonprofit community organizations and other groups that provided information to DSNY together diverted 6,600 tons of clothing and textiles from the municipal waste stream.[4]

Clothing and textile reuse practices include resale and exchange programs; waste reduction practices include mending and rental of clothing and linens; and recycling practices include fabric upcycling (e.g., creating new, higher-value clothing from fabric scraps) and downcycling (e.g., using discarded fabric to produce insulation or carpeting). **Table 4** summarizes textile diversion efforts in New York City.

[v] City Harvest Community Partner sites are distinct from donateNYC Partners.

Table 4. Textiles and Clothing Programs, 2023

Program	Program Type	Diverted (Tons)
DonateNYC (partner organizations, including Housing Works)	Clothing collection	1,703
RefashionNYC, DSNY-sponsored events, nonprofit collections, and public bins	Clothing collection and thrift	6,673*
GrowNYC Stop 'N' Swap	Clothing exchange	176
FabScrap	Recycling	41**
Total		**8,593**

Source: *2023 Annual Report NYC Municipal Reuse and Recycling Statistics; GrowNYC 2023 Impact Report; FabScrap 2023 Annual Report*
Notes:
* Indicates DSNY fiscal year, rather than calendar year tonnage.
** Indicates collections at multiple FabScrap locations, including New York City and Philadelphia. For this summary table, an assumption is made that the Philadelphia location of FabScrap diverted a minimal amount of fabric.

Second-Hand Markets and Thrift Shops | Reuse

Donated clothing supports secondary markets locally and globally. Local secondary markets, such as thrift stores, collect high-value clothing donations. Mid-quality clothing donations are sent to secondary markets in developing countries. Low quality clothing and textile donations may be recycled or disposed of. In 2019, there were 158 donateNYC partner organizations participating in secondhand clothing and non-clothing textile retail in thrift shops and vintage boutiques (this includes organizations that supported the refashionNYC initiative).[10]

Clothing donated to and sold at thrift shops supports organizations such as Housing Works, a nonprofit founded in 1990 that collects and resells clothing from commercial and residential drop-off bins across New York City[34] In 2016, the refashionNYC program began to collect textiles from residential buildings with 10 or more units. Since then, the number of enrolled buildings has more than doubled, serving 2,460 buildings and collecting 1,948 tons of materials in 2024. The in-building textiles collection program was renamed DSNY Textile Collection in 2025.[35]

Resale | Reuse

In New York City, 46 organizations participate in cooperative retail, such as consignment stores and flea markets based on the *2019 NYC Reuse Sector Report*. These entities derive a profit from the sale of secondhand products and differ from thrift stores, which use revenue from sales to support charitable programs. Informal retail entities such as social media platforms and those that do not partner with donateNYC are not included in the above cooperative retail count.[10]

Items that are reused through resale maintain their value, and this system therefore attracts higher-value items. Those who provide material for resale are compensated for the clothing or textiles.

Exchange | Reuse

Clothing and textile exchanges, more commonly known as "swaps," are opportunities for communities to trade clothing and other items. Exchange programs are affordable, community-centric methods to obtain goods.

GrowNYC's Stop 'N' Swap initiative was a reuse program with events across the five boroughs. In 2021, GrowNYC hosted 13 events with over 2,000 participants and almost 11 tons of goods exchanged.[36] In FY24, DSNY held 38 reuse and recycling events attended by over 6,500 residents and collected over 46 tons of reusable goods for exchange or donation. Materials collected included clothing, houseware, books, appliances, arts and crafts, baby items, media, shoes, accessories, electronics, bedding, toys and games, pet items, personal hygiene, tools, music instruments, and unsorted intake. Leftover goods were recirculated at future events or given to Salvation Army, Project Hospitality Community Services Center, Goodwill, Salvation Army, All for Us Clothing, Central Queens Y – Food Pantry, Junk Luggers, Unidos Si Se Puede, or The Free Store Project.[37]

Rental | Reuse

DonateNYC partnered with 32 organizations that participate in rental or product sharing services for clothing or textiles in 2019. Clothing and textile rental programs reduce the costs and production of infrequently used items, such as formal wear, reducing the emissions and environmental burdens associated with the production of material.[10]

Mending | Waste Reduction

The repair of fabric materials through mending (by professional tailors or textile owners) extends the life of clothing and reduces waste production. Mending classes and gatherings are organized by New York City and Brooklyn public libraries, and by community centers. Textile and fiber shops also provide classes on mending. Dry cleaning, tailoring, and repair businesses often offer mending, darning, and other clothing repair services.

Fabric Upcycling and Downcycling | Recycling

The upcycling of clothing and textiles by independent designers to produce new items is increasingly popular. Fabric upcycling is possible when postconsumer fabric consists of a single fiber source that can be respun into new textiles. FabScrap, a nonprofit founded in 2016, partners with design businesses and manufacturers to collect, recycle, and resell fabric. In 2023, the organization diverted 148 tons of textiles from landfill.[38] In addition, the Sanitation Foundation's ReFashion Week promoted designers and stylists who focus on upcycling materials. The downcycling of postconsumer textiles creates fabric scraps for insulation, carpeting, padding, furniture lining, and rags.

Metals, Glass, and Plastic

Metals, glass, and plastic (MGP) are collected together in New York City. However, the different compositions and uses of these materials alter their recoverability. According to the *2023 Residential Waste Characterization Study*, metals, plastics, and glass comprised 16.6% of DSNY-managed residential refuse and recycling.[6] This percentage dropped to 7.8% of New York City's curbside collections in FY24, with approximately 285,917 tons of MGP collected).[4,39]

Table 5 summarizes sample metals, plastics, and glass waste reduction, recycling, and reuse programs in New York City.

Table 5. Summary of Select Metal, Plastics, and Glass Recycling Programs, FY24

Program	Material	Diverted (Tons)
DSNY Curbside Collections	Metals, plastics, and glass	285,916.8
Redeemed Bottles and Cans	Metals, plastics, and glass	77,405.6
DSNY-Managed Bulk Metal Collection*	Bulk metal	12,471.9
Total		**375,794.2**
Source: *2023 Annual Report NYC Municipal Reuse and Recycling Statistics* **Notes: *** This includes recycled metal from DSNY bulk collection operations, oil drums recycled through the Bureau of Motor equipment, and recycled metal tonnage from Covanta Essex.		

Curbside Recycling | Recycling

Curbside recycling is available to New York City residents and certain professional establishments that exist in residential portions of buildings. Professional establishments must obtain permission from DSNY and are required to pay a fee for DSNY curbside collection programs. Commercial entities that do not meet the requirements for DSNY curbside collections are required to work with a private carter or self-haul recyclable materials for appropriate disposal.

Curbside recycling in New York City includes most metals, plastics, and glass. These items are collected for recycling separately from paper and cardboard products and include the following:

- Mostly metal items, except electronics, can be recycled through curbside recycling. Large mostly-metal items, such as bikes, can be recycled through specialty programs or scrap yards.
- Glass bottles and jars can be recycled through curbside recycling. Windows, glassware, mirrors, Pyrex, and other specialty glass products are not accepted. Rigid plastic, including clamshells, plastic containers, housewares, appliances, and beverage cartons, are recyclable through curbside collections. Film plastics and expanded plastics packaging, however, are not recyclable through curbside recycling.

Beverage container recycling was formalized with the 1982 New York State Returnable Container Act, or "Bottle Bill," which went into effect in July 1983. Later amendments expanded the types of accepted containers. The Bottle Bill requires a 5-cent deposit on certain beverage containers. The deposit is refunded to the consumer upon return of these containers at a redemption center.[40] Proposed amendments to the Bottle Bill to further expand the types of accepted beverage containers and increase the refund value of containers are under review by the New York State Committee on Environmental Conservation.[41]

Beverage container recovery increased from 62% in 2013 to 68.3% in 2023.[40] In FY24, 77,405.6 tons of redeemable beverage containers were diverted.[4] According to the NY Bottle Bill Economic Impact Report by Eunomia, the Bottle Bill creates 5,726 full time employment opportunities through direct, indirect, and induced effects.[42]

Film Plastic | Recycling

Film plastics include plastic bags, plastic wrap, and soft plastic packaging materials including bubble wrap, air pillows, and plastic overwrapping are low density polyethylene (LDPE) products.

The New York State Bag Waste Reduction Law, commonly called the "Plastic Bag Ban," prohibits vendors from distributing plastic carryout bags to customers, with some exemptions, such as restaurants or similar food service establishments to carry out or deliver food.[43] In addition, the law requires stores to make film plastic recycling bins

available to customers. As allowed by New York State Environmental Conservation Law on Plastic Bag Reduction, Reuse and Recycling, New York City opted into a five-cent fee on paper bags.[44]

Plastic Container and Utensils Reuse | Waste Reduction

Plastic takeout and delivery containers, including clamshells, are a significant component of municipal solid waste.[45] In 2016, New York City Residents used 72,000 tons of plastic food service disposables.[46] According to the *2023 Waste Characterization Study*, New York residents (excluding New York City Housing Authority [NYCHA] residents) improperly placed non-bottle rigid plastic containers and packaging in refuse, which amounted to 33 pounds per household in 2023. The recycling of non-bottle rigid plastic containers improved between 2017 and 2023, increasing from 11.8 pounds per household per year 13.5 pounds per household per year in the respective years. NYCHA residents disposed of 11,961 tons of non-recyclable plastics in FY17.[47]

New York City has passed several laws to help reduce this type of waste. Local Law 64 of 2021 restricts the use of single-use plastic items in food establishments, including plastic straws, stirrers, and splash sticks.[48] Local Law 17 of 2023 prohibits food service establishments, couriers who deliver food, and food delivery platforms from providing eating utensils, extra eating containers, condiment packets, or napkins to customers for takeout and delivery orders unless the customer requests them.[49]

Some food service businesses, institutions, and event venues are exploring or implementing reusable dining ware for both eat in and take out. Reusable takeout and delivery containers can be sanitized and reused to reduce waste.

Scrap Metal | Recycling

The recycling of scrap metal can be handled by material specific processors who purchase bulk metal from end-users for recycling, particularly from C&D. The material is processed and resold for the manufacturing of new products.

In 2023, private transfer stations in New York City processed 965,607 tons of bulk metal.[50] Bulk metal collected through DSNY-managed programs accounts for more than half of that amount. For example, approximately 12,472 tons of bulk metal were collected through DSNY managed programs in FY24.[4]

Electronics

Because electronics may contain hazardous materials, electronic waste, or e-waste, must be disposed of separately from curbside recycling. Electronics recycling involves the sorting and dismantling of equipment and the recovery of valuable materials, including gold, copper, glass, and aluminum that can be reused as raw materials for future electronics. Formal e-waste recycling processes ensure that e-waste processors are provided with personal protective equipment that reduces exposure to lead or mercury. When e-waste is improperly disposed of in landfills, lead, mercury, and other hazardous materials may contaminate soil and groundwater.[51]

Under the New York State Electronic Equipment Recycling and Reuse Act, consumers must recycle electronic waste in an environmentally responsible manner, and electronics manufacturers must provide accessible and affordable recycling of e-waste for residents. Organizations, including corporations with 50 or more full-time employees and nonprofits with 75 or more full-time employees, are required to pay for electronics disposal services.[52]

Electronics that require special disposal include:[53]

- Computers and computer accessories (e.g., desktops, monitors, laptops, cables, mice, and printers)

- TV or video equipment (e.g., TVs, VCRs, cable boxes, receivers, antennas, and cables)
- Portable electronic devices (e.g., laptops, cell phones, and digital cameras)
- Home electronics (e.g., video game consoles and fax machines)

According to the *2023 Waste Characterization Study*, 0.5% of New York City's municipal solid waste could be attributed to e-waste. That study also documented the effects of the previously mentioned NYS Electronic Equipment Recycling and Reuse Act and found that between 2013 and 2017 the proportion of e-waste in the DSNY-managed waste-stream declined by 60%.

Global e-waste is estimated to be worth over $62.5 billion with an estimated 50 million tons produced each year.[54] By diverting e-waste from landfills or incinerators, DSNY can reduce the value lost through disposal. **Table 6** summarizes e-waste reduction, recycling, and reuse program tonnage in New York City.

Table 6. Electronic Waste Select Program Summary, FY24

Program	Program Type	Diverted (Tons)
DSNY E-Waste (ecycleNYC and SAFE Disposal Events)	Electronics recycling	1,185
Agency safe handling contracts; collection events by nonprofit community organizations, retailers, and others	Various electronics recycling	8,762
TOTAL		**9,947**
Sources: *2024 Annual Report NYC Municipal Reuse and Recycling Statistics*		

Electronics Repair | Waste Reduction

According to the 2019 *NYC Reuse Sector Report*, there are 771 organizations dedicated to electronics repair in the five boroughs, more than any other product repair type.[10] This may be due to manufacturer warranty, extended warranty programs, and the high costs of replacing versus repairing electronics compared to other products. In New York City, electronic and home appliance services, which include electronics repair shops, require licensing from the New York City Department of Consumer and Worker Protection.

The Digital Fair Repair Act, a state law implemented in 2023, supports right-to-repair of digital equipment by independent repair providers and consumers. Under this law, original equipment manufacturers are required to make available tools, parts, and documentation for the repair of electronic equipment. This law increases the accessibility and quality of repair of electronics, such as computers and smart phones. Increasing the ease of repair of electronics can reduce the amount of electronics that end up in the waste or recycling stream.

Electronics Resale and Donation | Reuse

As a first step for e-waste disposal, individuals and businesses should consider reselling or donating their unwanted electronics. Electronics that are still in good working condition may be sold to resale vendors. This alternative to electronics recycling can encourage electronics owners to maintain their products for their resale value and reduce waste.

Access to laptops and other information technology helps address inequity in education. Throughout the pandemic, donations of these items empowered students by giving them free or low-cost access to information technology. We Care Act NYC, a student-run nonprofit, provides hundreds of students with access to donated computers each year, in addition to providing e-waste recycling and computer refurbishing services.

Electronic Equipment Take-Back and Recycling Programs | Recycling

As a part of the New York State Electronic Equipment Recycling and Reuse Act, manufacturers are required to provide free and accessible electronics collections services for consumers, including businesses with fewer than 50 full-time employees, nonprofit organizations, and individuals. Manufacturers must also report to the State and pay vendors for recycling.

DEC maintains a list of electronic equipment manufacturers and their consumer electronic waste acceptance programs, and DSNY offers ecycleNYC, a free and convenient electronic waste collection program for residential buildings of 10 or more units.

When donation is not an option, businesses must contract with an e-waste recycler. DSNY recommends looking for companies with e-Stewards or R2 certifications when choosing a recycler, to ensure that the electronics are recycled responsibly and maintaining data privacy. E-Steward and R2 certifications require companies to undergo trainings and audits to ensure compliance with environmental health regulations. DEC maintains a list of registered recyclers.

New York City agencies are required to contract with a private vendor for safe handling of harmful and hazardous waste including ballasts, batteries, electronics, fluorescent bulbs, mercury-containing devices, and sharps. The City's Agency Safe Handling contract, managed by DSNY, is available to mayoral agencies for the removal of these materials. Each agency is responsible for registering the contract and paying for services purchased through the contract. Agencies can then either mail back the materials or schedule a pickup.

ERI is the largest provider of electronics collection services in the city. The company is the contractor for ecycleNYC and also collects electronics from retail stores. Smaller electronics collection providers in New York City include the Lower East Side Ecology Center.

Vendors manage an electronics take-back program for individuals, nonprofit organizations, and businesses with fewer than 50 full-time employees. The materials collected are reused or recycled.[55]

Municipal E-Waste Recycling | Recycling

DSNY organizes several e-waste recycling programs, including ecycleNYC, Community Recycling Events, SAFE (solvents, automotive, flammable, electronics) Disposal Events[vi], and Special Waste Drop-Off Sites[vii]. EcycleNYC is a DSNY partnership program funded and implemented by the company Electronics Recyclers International, Inc. (ERI), and via DSNY-managed SAFE Disposal Events. Through ecycleNYC, residential buildings with 10 or more units can enroll in electronics recycling collections.[56]

In 2024, 8,761 tons of electronics waste were collected by DSNY and partner organizations through collection events and in-building collection bins. Of that, 11.9% (1,184.6 tons) was collected directly by DSNY-managed SAFE Disposal Events and ecycleNYC drop-offs.[4]

[vi] In New York City, DSNY hosts SAFE Disposal Events in all five boroughs each spring and fall.
[vii] There are five Special Waste Drop-Off Sites located in each of the five boroughs. Drop off events are open three days a week with the exception of holidays and severe weather.

Paper and Cardboard

Recyclable paper includes mixed paper, newspaper, magazines, receipts, wrapping paper, cardboard, and corrugated cardboard. Laminated paper products and spiral bound books are not recyclable; heavily soiled or greasy cardboard should not be recycled but can be composted.

According to the 2023 *Residential Waste Characterization Study*, 16% of recyclable material was clean paper or cardboard.[6] Paper products can be reused through programs such as Materials for the Arts, organized by the Department of Cultural Affairs (DCLA). **Table 7** summarizes information on paper and cardboard recycling in 2023.

Table 7. Paper and Cardboard Recycling Summary, 2023

Processor	Material Type	Diverted (Tons)
Pratt	Paper product recycling	131,775
Sims Municipal Recycling	Paper product recycling	165,669
TOTAL		**297,444**
Source: *DSNY Recycling Summary Report 2023 - 2024*		

Paper Recycling | Recycling

Paper recycling involves the collection, repulping, and forming of paper products, including cardboard. In New York City, residential paper and cardboard are collected by DSNY through curbside and containerized recycling. Paper collected by DSNY is transferred to one of several processors, including Visy/Pratt, a paper recycler and packaging manufacturer on Staten Island.[57] In FY24, DSNY collected 299,083 tons of paper materials, which accounted for 9.4% of DSNY-managed curbside and containerized municipal solid waste in the 2024 fiscal year.[4]

Creative Reuse | Reuse – Waste Reduction

Unused paper products can be donated for creative reuse. Materials for the Arts, a DCLA initiative, collects paper and other unused arts and crafts supplies for reuse by schools and nonprofit partners. In 2018, Materials for the Arts collected an estimated 845 tons of materials, including paper, buttons, and other art supplies, and distributed them to partner organizations.[58] The amount of material collected through this program is not included in **Table 7**, because not all the art supplies collected are paper.

Donation | Reuse – Waste Reduction

While not all paper products are suitable for reuse, books are one of the simplest items to rehome. Book donation can occur locally, through schools, public libraries, or organizations like Books Through Bars, Reach Out and Read, and Reading Reflections.

Libraries | Reuse – Waste Reduction

Libraries provide many services, including acting as a center for reuse and waste reduction for books and other media. New York City Public Library and Brooklyn Public Library support reuse and waste reduction by organizing book sales, lending materials, and reducing the quantity of material that requires printing. The New York Public Library has 90 locations across the city's boroughs. The total number of books checked out is unclear; however, some titles have been borrowed as many as 150,000 times between 2020 and 2022.[59]

Construction and Demolition (C&D) Debris

In New York City, C&D debris may include concrete, stone, dirt, asphalt, wood, metal, dry wall, insulation, light fixtures, and carpeting.[60] According to New York State Solid Waste Management (Part 360) regulations, materials that are not considered C&D debris, even if generated from construction, remodeling, repair and demolition activities, include MSW, friable asbestos-containing waste, corrugated container board, electrical fixtures containing hazardous liquids such as fluorescent light ballasts or transformers, fluorescent lights, furniture, appliances, tires, drums, fuel tanks, containers greater than 10 gallons in size, and any containers having more than one inch of residue remaining on the bottom.[61]

More than 6.37 million tons of C&D waste, including fill and mixed C&D debris, was processed at private transfer stations in New York City in 2019.[62] According to the Department of Design and Construction (DDC) *Construction & Demolition Waste Manual*, over 60% (by weight) of the city's solid waste stream can be attributed to C&D debris, with an estimated 19,500 tons per day of fill materials and an additional 13,500 tons per day of other C&D waste.[60]

The "other" category of C&D waste includes recoverable materials, including metal (except hazardous metals, such as lead pipes), cardboard, wood, and salvage (including appliances, architectural features, circuit breakers, office furniture, windows, doors, and wood timbers). Source separated material typically provides for the highest recycling rate, and therefore the best price for materials.[60] C&D processors may accept metal scrap for recycling or disposal.

According to the DDC manual, C&D material management priorities are 1) waste prevention, 2) reuse or salvage of materials, 3) recycling or repurposing of materials. If material from construction and demolition cannot be minimized, reused, or recycled, it will be landfilled.60[60] C&D materials reuse is one of the focus areas of DDC's Town + Gown research program through the Urban Resource Recovery Working Group.[viii,63] **Table 8** summarizes C&D waste reduction, recycling, and reuse programs through the New York City Department of Transportation (NYCDOT) and Mayor's Office of Environmental Remediation (MOER). Additional information about these programs is provided below.

Table 8. Select C&D Material Recovery Summary, 2024

Program	Program Type	Diverted (Tons)
NYCDOT	Recycled asphalt pavement (RAP)	263,231
NYCDOT	Recycled concrete aggregate (RCA)	22,097
MOER	Fill exchange	70,908
TOTAL		**356,236**
Sources: *NYCDOT data on RAP and RCA; MOER data on fill exchange.*		

Asphalt Millings | Reuse

Asphalt millings or reclaimed asphalt pavement (RAP) is produced from pavement discarded when asphalt is milled during road removal, repaving and repair. Asphalt milling can be ground into as a component of new asphalt and used in to pave roadways. The New York City Department of Transportation (NYCDOT) recycled 292,076 tons of asphalt in FY22.[64] New asphalt is made at Hamilton and Harper Asphalt Plants. Between 2016 and 2022, NYCDOT recorded annual RAP production at 291,217 tons.[65] NYCDOT also produces recycled concrete aggregate (RCA) from crushing and screening waste concrete at its yard in Sunset Park, Brooklyn. In 2021, NYCDOT provided 20,053

[viii] Town + Gown is a city-wide university-community partnership program, that has been bringing academics and practitioners together on research projects to support practice and policy in the construction and design field.

tons of RCA to its Sidewalk Inspection and Management crews and to private industry and community developments.[64]

Fill Materials | Reuse

Fill materials include concrete, stone, and dirt generated from excavation. Fill materials may be used as fill in construction projects, as cover material at landfills, as feedstock in asphalt or aggregate plants, as aggregate in road structures and sub-base, or as manufactured soil. According to DSNY, in 2022, there were 19 fill processors in New York City, and in 2023, 3,139,636 tons of fill material were processed at private transfer stations.[22, 66]

MOER coordinates a soil stockpile and exchange program, known as the Clean Soil Bank. Through this initiative, 76,224 tons of clean soil were transferred for reuse by New York City-based construction projects, with additional material taken to or from the stockpile.[67]

Metal | Recycling

Ferrous and non-ferrous metal may be recycled. Metals that cannot be recycled include lead, such as from lead pipes.

Cardboard | Recycling

Cardboard recovered from the construction and demolition process may be recycled.

Wood | Recycling

Wood and wood products, including treated, painted, and clean materials, are recyclable. Wood waste may be processed into mulch, or a fuel product.

Salvage | Reuse

Demolition and construction projects provide opportunities to salvage materials, including wood, stonework, doors, furniture, appliances, light fixtures, and windows, that can be repurposed in architecture or interior design. For example, over 100 tons of wood beams and architectural features were salvaged from the deconstruction and renovation of Four Times Square as part of a redevelopment effort in Midtown Manhattan that was completed in 1999.[6060]

Programs and organizations including Materials for the Arts, Habitat for Humanity, and Big Reuse may accept reusable building materials and contents.

Harmful or Hazardous Waste

Harmful or hazardous waste includes a variety of items that may not be safely disposed of through residential curbside pickup. Although many harmful or hazardous waste materials cannot be recovered for reuse or recycling, items that may have extended lives include paints, rechargeable batteries, and appliances containing refrigerants (i.e., refrigerators, air conditioners, etc.). DSNY collections services recovered approximately 1,653 tons of harmful

products in FY24.[4] **Table 9** summarizes sample harmful and hazardous waste reduction, recycling, and reuse programs.

Table 9. Select Harmful and Hazardous Waste Program Summary, FY24

Program	Program Type	Diverted (Tons)
DSNY Safe Disposal and Special Waste Drop-Off Events	Drop-off and collection for harmful and hazardous wastes	1,652.6
Call2Recycle	Drop-off and collection for rechargeable battery recycling	24.4
TOTAL		**1,677**
Source: *2024 Annual Report NYC Municipal Reuse and Recycling Statistics* **Notes:** CFC: chlorofluorocarbons; HCFC: hydrochlorofluorocarbons		

Paint Recycling | Reuse – Recycling

New York State's Postconsumer Paint Collection Program, established in 2019 as Title 20 of New York's Environmental Conservation Law, requires producers of architectural paint (interior and exterior architectural coatings sold in containers of five gallons or less, including house paint and primers, stains, deck and concrete sealers, and clear finishes) who sell paint in New York State to take part in a postconsumer collection and recycling program. Producers are prohibited from selling or offering for sale architectural paint in the state unless the producer and their brands are registered with DEC as participating in an approved program.[68]

PaintCare is an organization that represents paint producers in New York and in other states that have implemented similar programs. The organization collects paint from drop-off sites where households, businesses, government agencies, and others with leftover or unwanted paint can take these products for recycling. DEC granted a conditional approval to PaintCare on its revised postconsumer paint collection program plan submitted to the Department on December 1, 2021. New York City residents can drop off unwanted or leftover paint at these events.[69]

Rechargeable Batteries | Recycling – Waste Reduction

Rechargeable batteries are a form of waste reduction as they reduce the number of non-rechargeable batteries produced and used. Recycling rechargeable batteries allows for reduced strain on finite resources required for rechargeable battery production and hazardous mining practices. However, rechargeable batteries, similar to other electronic waste, contain hazardous metals. Appropriate recycling of rechargeable batteries is important to reduce the risk of fire or chemicals leaching into soil and water.[70]

Rechargeable batteries can be recycled at DSNY SAFE disposal events and Special Waste Drop-Off Sites. In 2024, DSNY reported 24.4 tons of rechargeable batteries collected for recycling.[4, 71] As of 2010, rechargeable batteries may also be returned to retailers and distributors of rechargeable batteries in accordance with New York State Rechargeable Battery Law.[72]

Appliances with Chlorofluorocarbons | Recycling

Refrigerants act as potent greenhouse gases if released into the atmosphere. Local Law 69 (LL69) of 2013 and Chapter 17 of Title 16 of the Rules of the City of New York address this issue by regulating the recycling of appliances containing refrigerants, such as air conditioners, watercoolers, refrigerators, and freezers. LL69 is a manufacturer-funded program requiring appliance manufacturers to recover refrigerants from their appliances at the time of disposal

by city residents. These manufacturers may create their own refrigerant recovery program, participate in a program with other manufacturers, or use DSNY's refrigerant recovery program. Manufacturers are charged a fee if they use DSNY's refrigerant recovery program.

After LL69 was enacted, the Association of Home Appliance Manufacturers challenged the law, arguing, in part, that it was preempted by New York State Law.[73] The Southern District of New York held that LL69 was a valid and enforceable exercise of the City's police power, but that the section requiring manufacturers to be responsible for recovering specific chlorofluorocarbons (CFC) compounds (CFC-11, CFC-12, CFC-113, CFC-114, and CFC-115), which is covered by NYS ECL Article 38, was preempted. All other Class I and Class II ozone-depleting substances and substitute substances as defined by the U.S. Environmental Protection Agency (EPA), continue to be regulated by the City. The recycling of CFCs and hydrochlorofluorocarbons (HCFCs) is also regulated by the Montreal Protocol and EPA.

Repair or reuse, where applicable, are the preferred waste reduction strategies for CFC and HCFC-containing appliances. If items cannot be repaired or reused, appliances should be recycled responsibly. Recycling of CFC and HCFC-containing appliances involves the deconstruction and appropriate recycling of parts by their components (i.e., plastics, glass, and metal) and the removal and reuse of the refrigerant.

Appliances containing non-flammable CFC refrigerants may be collected by DSNY curbside services, through manufacturer recycling programs, or specialty waste removal vendors. Appliances (except for air conditioners and refrigerators) containing propane and other flammable refrigerants such as ammonia, isobutane (R600a), HFC32 (R32), and propylene must not be placed for curbside collection and are not accepted at Special Waste Drop-off Sites, though they may be brought to SAFE Disposal Events. DSNY curbside pickup of appliances containing refrigerants is available to residents free of charge, though an appointment through a 311 call is required. After making an appointment, residents may place the appliances curbside for refrigerant recovery and pickup, after 6 p.m. the evening before the appointment.

When appliances containing flammable refrigerants are placed curbside for collection, DSNY tags the appliances with a red sticker informing residents how to safely dispose of them. Residents can also contact the manufacturer or a hazardous waste vendor for safe disposal options.

DSNY does not pick up refrigerant-containing appliances from commercial businesses. Businesses must instead hire private companies qualified to dispose of refrigerants properly.

Vehicles

Repairing and recycling are the preferred methods for managing discarded vehicles, which may be sold or donated for reuse in New York City. Vehicle recycling involves dismantling and collecting electronics, rubber tires, and materials, primarily metal, from the vehicle's frame. Vehicle waste reduction strategies include the rental of vehicles and the use of public transport, when available.

Repair | Waste Reduction

Vehicle maintenance and repair are standard practice with auto-repair mechanics. Vehicles in New York State require annual inspection, decreasing the risk of major maintenance repair requirements. There are approximately 1,500 vehicle repair facilities across New York City.[74] If vehicles are not suitable for repair, they can be taken apart to be sold for parts.

Disposal | Recycling

Vehicles may be disassembled for parts. Residents may place metal recyclables from vehicles for curbside collection by DSNY. Harmful or hazardous substances, including oil and batteries, may be dropped off at DSNY Special Waste Sites or SAFE Disposal Events.

Vehicles may also be taken to facilities for dismantling and recycling of vehicles. Vehicles sent to these facilities are crushed, shredded, and dismantled to be reused for the manufacturing of new vehicles.[75] In FY24, 11,100 tons of abandoned vehicles were diverted for recycling in New York City. There were 71 active vehicle dismantling facilities in New York City as of 2022.[76]

Tires | Recycling - Reuse

Residential tires can be dropped off at DSNY garages, DSNY Special Waste Drop-Off Sites or at businesses that sell or install tires. In FY24, DSNY collected 577.2 tons of tires and sent them to be used for tire-derived fuel under City contract.[4] In 2017, 47,374 tons of tires were collected by private carters that serve New York City. This number is based on voluntary, non-inclusive surveys, which could result in under-reporting.[77]

Tires can be retreaded and reused or recycled to be used as fuel; as rubber products, including rubber crumb; as a component in asphalt; as landfill cover; and in construction projects.[10, 78]

Rechargeable Batteries | Recycling

Rechargeable batteries in electric vehicles have become more popular since 2010 when these vehicles became available to consumers.

Furniture and Appliances

The informal resale, gifting, and collection of items from sidewalks is frequent in New York City with online platforms and social media “buy nothing”, gifting, or stooping[ix] accounts, providing community-driven material exchanges, particularly for furniture and appliances. The informal nature of these programs alongside the vast array of platforms makes it difficult to quantify the extent to which informal resale and stooping drive reuse practices in the city.

Donation of furniture and appliances for reuse extend the life of an item, thereby reducing the production of new products. There were 220 donateNYC partner organizations that participated in appliance reuse and 269 that participated in furniture reuse between 2017 and 2018.[10]

Furniture and appliance repair can also extend the life of products. There are approximately 230 repair entities that partner with donateNYC for furniture and appliance repair.[10]

Furniture rental offers an effective waste reduction strategy for short-term residents by providing an alternative to new purchases, informal resale, and stooping. There are fewer than a dozen furniture rental companies that provide services in New York City.

[ix] Stooping is the practice of placing items in good condition on curbs for members of the public to take and use. Often the items will have signs indicating they are available.

Furniture and appliances composed primarily of plastic or metal may be recycled. Furniture made of multiple materials may be reused or repaired to extend the life of the item. Furniture and appliances made up approximately 669.5 tons of donated material through donateNYC and partner organizations in 2023.[6]

Specialty Recycling and Reuse Services

Specialty recycling and reuse programs are common in New York City. A few examples are provided below.

- Recycle-A-Bicycle is a nonprofit organization that educates community members about bicycle riding and safety and refurbishes bicycles for resale, thereby extending the life of products. The organization reuses an estimated 5.8 tons of material each year.[79]
- Play:groundNYC is an adventure playground on Governors Island. Filled with old tires, discarded lumber, used toys, and other materials, usually removed from the waste stream, it encourages children to use their imaginations and build their own structures from salvaged materials.
- The Book Fairies is a nonprofit organization that collects and redistributes books to underserved communities in New York City and Long Island. The organization accepts donations of new and gently used books and works with schools and other community organizations to distribute them.
- MusiCan is a nonprofit organization that accepts musical instrument donations and redistributes them to New York City schoolchildren in underprivileged neighborhoods. The Brooklyn Public Library also lends musical instruments.

Summary

Waste reduction, reuse, and recycling programs provide opportunities to reduce environmental impacts and improve public health. Programs provided in New York City are primarily managed by DSNY. Additional programs are managed and funded by DEP, NYCDOT, DCLA, Parks, nonprofit organizations, and for-profit businesses.

Human and environmental health is improved when less waste goes to landfills and incinerators, thereby reducing air and water pollution from facilities that process waste. Furthermore, addressing waste reduction at its source by decreasing the amount of goods produced results in less greenhouse gas emissions from the mining, manufacturing, and transportation of materials and products.

In FY24, 825,879 tons of material were diverted from landfills and incinerators for reuse, recycling, or waste reduction, including through curbside and containerized collections and specialty waste collection services.[4] Materials not considered in this value include those managed independently through businesses and nonprofit organizations.

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NYC Solid Waste Management Plan 2026

Attachment C: Accessible Capacity for New York City Waste Management

Overview

This memorandum describes New York City's current and future capacity for managing solid waste. It includes the amounts and types of waste currently managed by the Department of Sanitation (DSNY) and private vendors; facility capacities; available waste transportation modes; and waste management options to help the City effectively identify and address potential infrastructure and operational gaps and risks, and make informed decisions regarding waste diversion policies, asset and capital allocation, and infrastructure development.

The memorandum is divided into three main sections:

Section 1. Solid Waste Management Facilities describes solid waste, recycling, and organics waste management facilities that are or could be used to manage residential and commercial waste generated in New York City, including transfer stations, recycling facilities, organics processing sites, incinerators, landfills, and special waste processing centers. The discussion includes available capacity and throughput information as well as estimated capacity calculation methodologies and analyses. Key conclusions include the following:

- New York State is projected to exceed MSW landfill capacity within 25 years.
- Out-of-state landfills, which New York City relies upon heavily, also have limited future capacity.
- Capacity for organic waste processing must increase over the next decade to accommodate the expanded residential organics collection program.

Section 2. Export of DSNY Solid Waste describes the current waste transportation modes—truck, rail, and barge—and their advantages, risks, and challenges. Most DSNY-collected waste (85%) leaves the city by rail, heading to landfills or incinerators. This reliance on rail means a rail strike or natural disaster that disrupts rail service has the potential to cause disruptions in waste management. Current rail infrastructure projects, including the Interborough Express and Penn Station Access, should positively impact waste transportation upon completion. Truck driver shortages, however, are an ongoing concern, as they can cause significant delays in waste collection and export.

Section 3. Private and Public Waste Management Facilities and Contracts discusses the ownership and operation of waste management facilities and contracts for managing DSNY-collected waste. Most of the long-term contracts are more than halfway through their initial 20-year duration.

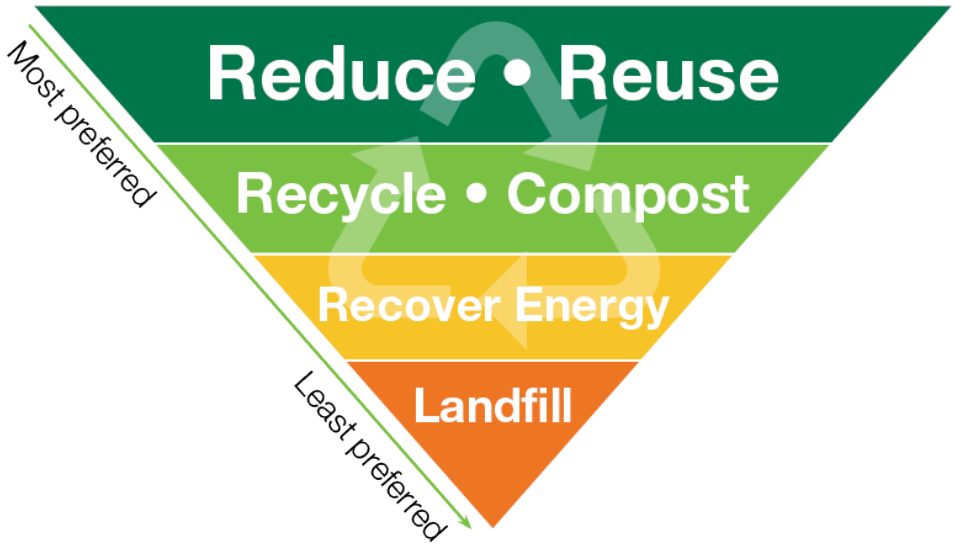
Solid Waste Management Hierarchy Overview

Solid waste management includes waste reduction, reuse, recycling, incineration, and landfilling. The US Environmental Protection Agency (EPA) solid waste management hierarchy prioritizes waste management practices based on environmental impact. This is outlined below from the most preferred to least preferred waste management

options and depicted in **Figure 1**. An emphasis is placed on waste reduction, reuse, and recycling.[1] The New York State Department of Environmental Conservation (DEC) has adapted this hierarchy:

1. Reduce the amount of waste generated.
2. Reuse material for the purpose for which it was originally intended or to recycle material that cannot be reused (For this purpose, composting and anaerobic digestion are considered forms of recycling.)
3. Recover, in an environmentally acceptable manner, energy from solid waste that cannot be economically and technically reused or recycled; and
4. Dispose of solid waste that is not being reused, recycled or from which energy is not being recovered, by land burial or other methods approved by DEC.

Figure 1. EPA Waste Hierarchy



The solid waste hierarchy indicates that the majority of materials should be reduced, reused, or recycled. Practical challenges, including resource recovery capacity, difficulty in source separation of materials, costs, reusability of materials, and other factors can make it more difficult to efficiently reuse or recycle all materials. Of the commercial business waste managed at facilities within New York City in 2022, approximately 26% was managed at recycling facilities or as source separated organics. This estimate does not include commercial waste that is directly hauled to facilities outside of New York City, construction and demolition debris, fill, scrap metal, or special waste. Additionally, between 17%-20% of DSNY-collected waste—which includes waste from residences, City agencies, and some institutions, —is diverted from landfills and incinerators annually.[2]

This memo does not address capacity for material repair and reuse. Repair and reuse programs are essential waste diversion efforts; however, they represent a different operating system than the solid waste management functions described in this memo. More information on DSNY-sponsored and other New York City waste reduction programs is available in in **Attachment B: Existing Waste Reduction, Reuse, and Recycling Programs in New York City**.

Section 1. Solid Waste Management Facilities

Municipal solid waste (MSW) is managed by a variety of facilities depending on waste source and type. DSNY collects waste generated by residents, city agencies, and some institutions while private waste haulers collect waste generated by private entities (offices, restaurants, private institutions, and other businesses and industries). MSW is then transported to transfer stations (also referred to as transfer facilities), processing facilities, or disposition sites. Most waste generated in New York City moves through transfer stations, where material may be sorted prior to containerization. Once containerized, MSW is transported to disposition sites, such as incinerators or landfills.

MSW designated for recycling or material recovery, including paper, metal, glass, plastics, and organic waste such as food scraps and yard trimmings, is sent to processing facilities. Contaminants (materials not appropriately set out for recycling or organic waste management) are separated from the recyclable or organic materials and disposed of at landfills or incineration sites as residue. Material recovered through recycling may be sold to end markets, where the material can be used in the formation of new products. MSW can also be transported directly to a disposition site or processing facility without first going to a transfer facility. Some recycling processors that receive DSNY-collected material, such as the Pratt Industries paper plant, recycle material into new products onsite.

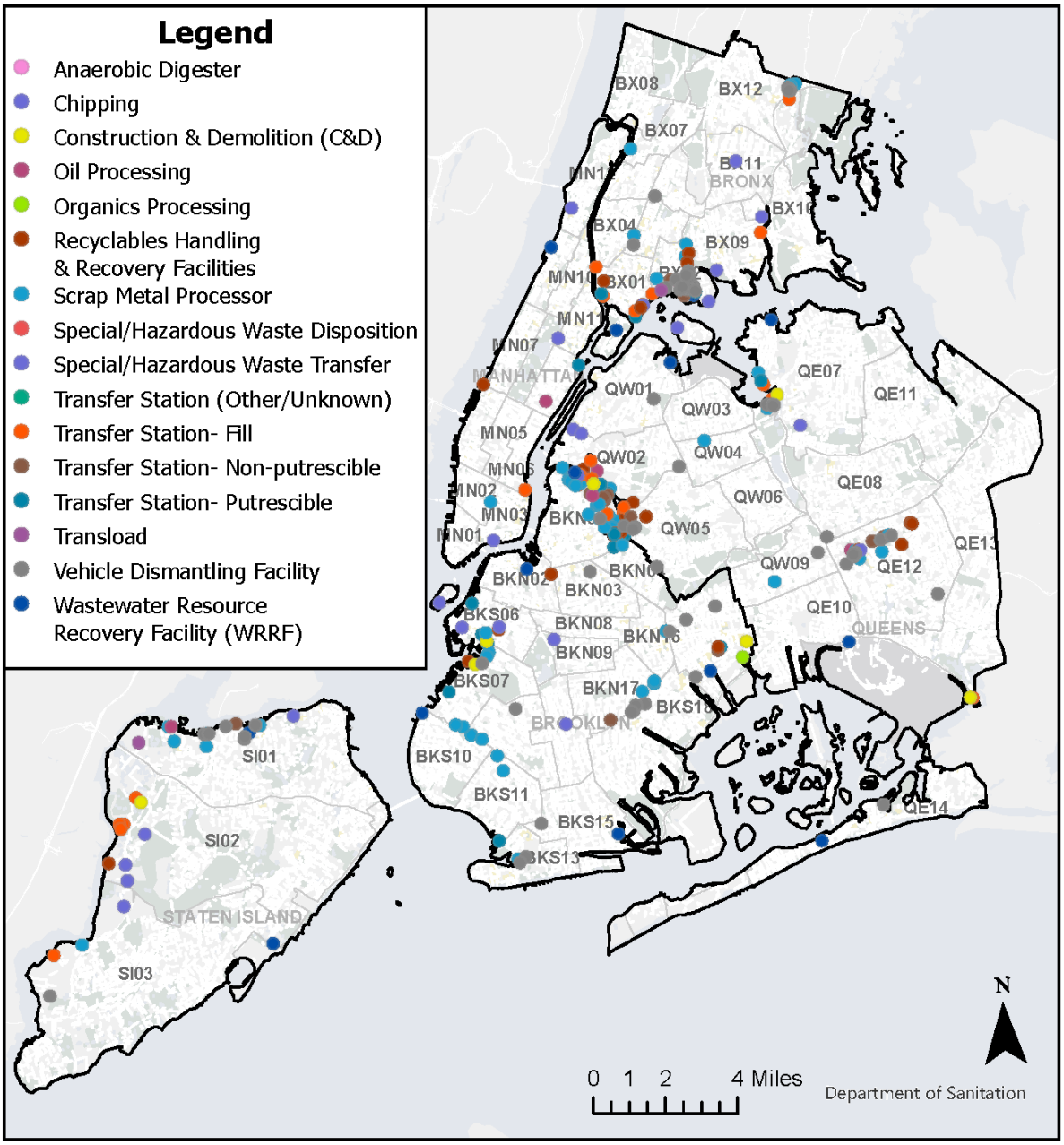
Construction and Demolition (C&D) debris (such as soil, concrete, brick, lumber), which may be generated by public or private entities, is collected by private waste haulers and delivered to transfer stations or processing facilities. If material is sent to transfer stations, it may be sorted prior to transport to a disposition facility, processor, or end-market for recycling or reuse.

Below is a list of facilities and associated materials that are part of the waste management process:

- **Transfer stations**, including marine transfer stations, manage trash (putrescible transfer stations) and C&D materials (non-putrescible transfer stations and fill transfer stations). Some transfer stations also accept materials set out for recycling, and source separated organics.
- **Recycling facilities** manage paper, and/or metal, glass, plastic (MGP), scrap metal, and bulk metal. There are also recycling facilities for special or hazardous waste such as used motor oil, electronics, and batteries. Recycling facilities can perform one or multiple activities, which including sorting, processing, or recovery. Sorting of material allows for increased recycling rates and the recovery of higher quality material. Various types of recycling processing may recover the recycled material for use as a source material or convert it into new products.
- **Organics processing sites** or facilities accept and process food scraps, yard trimmings, and other organic waste (and fats, oils, and grease (FOG)). Organics processing may involve composting, chipping wood for mulch, anaerobic digestion, and thermal drying of material. There are also facilities that manage biosolids produced from wastewater treatment, organic materials whose handling is more heavily regulated.
- **Incinerators** burn or combust waste, reducing the space necessary for disposal. Many incinerators produce energy from waste combustion and recover metals. Ash from incinerators is disposed of at landfills.
- **Landfills** serve as end-site for waste disposal.
- **Transload facilities** move materials from one mode of transportation to another, allowing waste collected and transported via truck or barge to be exported long-distance via rail for disposal.
- **Special waste processing** sites treat hazardous wastes, such as solvents and mercury-containing products, to mitigate toxic, corrosive, reactive, and ignitable properties, allowing for safe disposal.

Transfer stations, recycling processors, wastewater resource recovery facilities, C&D debris handling and recovery facilities, landfills, and incinerators are described in this section. **Figure 2** shows these facilities in New York City. Transload facilities, which transfer containerized waste from one mode of transportation to another (e.g., truck to barge or rail), and special waste processing sites, which provide safe disposal of hazardous wastes (e.g., solvents and mercury-containing products), are not included in this section.

Figure 2. New York City Waste Management Facilities



DEC regulates solid waste management facilities in accordance with New York Codes, Rules and Regulations (NYCRR) Part 360. Waste management facilities in New York State must be permitted or registered unless exempt under the rules. Non-exempt facilities are subject to the following requirements:[3]

- Construction, operation, or facility modification must be in accordance with registrations, permits, or approval from DEC.
- Facilities may not be sited in special flood hazard areas or wetlands in manners that cause or contribute to threatened or endangered species loss or habitat destruction.
- Facilities must report to DEC and allow inspection.
- Facilities must comply with environmental monitoring services, if requested by DEC.
- Facilities must comply with closure requirements.

Additional New York State regulations apply for specific materials and facility types. The materials managed and the capacity of a given facility determine whether the facility requires a registration, permit, or is exempt.

Transfer Stations

Transfer stations receive and consolidate waste (including C&D debris at non-putrescible transfer stations and fill transfer stations) and/or recyclables collected by DSNY and/or private carters. After being consolidated at a transfer facility, the material is transported to another facility for processing or disposition. Transfer facilities may be publicly or privately owned.

Transfer stations must be registered or permitted with DEC, unless exempt. Registered transfer stations must be owned or operated by, or contracted by or on behalf of, a municipality and receive less than 50 tons of waste per day. Exempt facilities may accept a limited quantity of waste depending on material type and ownership. All transfer stations that accept 50 or more tons of waste per day or otherwise do not meet the criteria for an exempt or a registered facility must obtain a permit. Comprehensive details on state transfer station classifications can be found on DEC's website. All transfer stations must submit annual reports to the DEC, which include the amount of waste received, information on where the waste was generated (the planning unit), and the destination of the waste after it leaves the facility.[4]

A total of 61 DSNY-owned and private transfer stations in New York City were active in 2023 (not including recycling, composting, or scrap metal facilities):[5,6]

- Five DSNY-owned waste transfer stations (including four marine transfer stations)
- 15 private transfer stations that accepted putrescible waste (of these private transfer stations, six accepted both commercial and DSNY-collected waste and one, the Waste Management transfer station at Review Avenue, accepted exclusively DSNY-collected waste)
- 22 private transfer stations that accepted mixed C&D material (drywall, lumber, insulation, etc.)
- 19 private transfer stations that accepted fill (soil, concrete, rock, etc.)

DSNY-Owned Transfer Stations

New York City's Community Districts are used as boundaries for DSNY's waste collection network of 59 sanitation districts. These districts are aggregated into seven operating zones: Bronx, Brooklyn North, Brooklyn South, Manhattan, Queens East, Queens West, and Staten Island.

Each transfer station that accepts DSNY-collected waste serves specific sanitation districts. **Figure 3** shows transfer stations and their associated sanitation district zones.

DSNY owns five putrescible waste transfer stations which processed nearly 1.5 million tons of waste in 2023, accounting for 48% of DSNY-collected waste.[7] Four of these facilities are Marine Transfer Stations (MTSs), which accept and containerize DSNY-collected residential and institutional waste. The containers are then transported by barge to intermodal facilities that export the material by rail for disposal. [8] DSNY has long-term export contracts with vendors for these four MTSs as follows:

- 91st Street MTS in Manhattan, under export contract with Reworld
- North Shore MTS in Queens, under export contract with Reworld
- Hamilton Avenue MTS in Brooklyn, under export contract with Waste Management
- Southwest Brooklyn MTS in Brooklyn, under export contract with Waste Management

DSNY also owns the Staten Island Transfer Station (SITS), which, through a contract with Republic Services, exports DSNY-collected MSW in containers via rail to the Port Liberty Terminal on Staten Island.

Additionally, DSNY owns the 59th Street MTS and manages DSNY-collected mixed paper.

The City also owns five special waste drop-off facilities that accept and transfer special waste, including household hazardous waste, such as used vehicle or cooking oil, batteries, electronics, and end-of-life tires.

Private Transfer Stations

Private Transfer Stations are owned and operated by private businesses and may accept waste generated by commercial, institutional, and residential uses; C&D debris; or fill. Some transfer stations also accept organics, recyclables, bulk metal, and scrap metal. DSNY oversees private transfer stations within New York City in the following three categories:

- putrescible waste
- non-putrescible waste (C&D debris)
- fill (a subset of C&D debris that can include soil, dirt, concrete, rock, gravel, stone, or sand[9])

Transfer stations that receive less than 500 tons per day of uncontaminated fill or less than 500 tons per day of restricted use fill require a DEC registration rather than a permit.[10]

DSNY contracts with private transfer stations to manage some DSNY-collected waste. The transfer stations used for DSNY-collected waste are shown in **Table 1**. The three transfer stations owned by Waste Management are currently under the Long-Term Export Program with the City. These three private stations also accept commercial waste. DSNY also has interim contracts with private transfer stations that are contracted to transfer DSNY-collected waste as needed (see **Table 1**). In 2024, three private transfer stations held interim contracts with a total of 2,345 tons per day (TPD) contracted by DSNY. **Figure 3** shows the service areas for facilities contracted for long-term export (DSNY-owned and private).

Based on daily contracted tonnage and average daily delivered throughput included in **Table 1,** in 2023, there was approximately 60% remaining capacity for DSNY-collected waste at transfer stations owned or contracted by DSNY. Thirty-nine percent of the capacity at DSNY-owned MTSs and SITS was used. Approximately 63% of the contracted

capacity at private transfer stations with long-term contracts was used. Ten percent of the capacity procured through interim contracts was used in 2023.

Table 1. Putrescible Transfer Stations Used for DSNY-Collected Waste Permitted or Contracted Capacity and Throughput, 2023

Transfer Station	DSNY Typical Permitted or Contracted Throughput (TPD)	Contract	Average Delivered by DSNY or Authorized Users (TPD)	Total DSNY-Managed Throughput (TPY)
91st St. Marine Transfer Station	1,860	LT	481	143,935
Hamilton Marine Transfer Station	3,520	LT	1,414	422,655
North Shore Marine Transfer Station	3,672	LT	1,616	483,068
Southwest Marine Transfer Station	2,106	LT	888	265,620
Staten Island Transfer Station	1,950	LT	696	208,064
Waste Management (Harlem River Yard)	3,150	LT	1,985	593,643
Waste Management (Varick Avenue)	1,425	LT	1,079	322,712
Waste Management (Review Avenue)	1,800	LT	980	292,915
American Recycling	750	INT	38	11,219
Regal Recycling	250	INT	25	7,511
Tully Environmental	1,345	INT	173	51,702
Total	21,828	N/A	9,375	2,840,892

Notes: DSNY – New York City Department of Sanitation; TPD—tons per day; TPY—tons per year; INT—interim; LT—long-term.

The total throughput (TPY) does not include DSNY-collected waste transported directly to the Reworld Essex incinerator in New Jersey.

Transfer stations noted in Bold reflect facilities owned by DSNY.

Source: NYC OpenData: DSNY Disposal Sites Used by Facilities by Year; DSNY Current Contract Board, 2024

Figure 3. DSNY-Owned and Contracted Transfer Stations and Service Areas

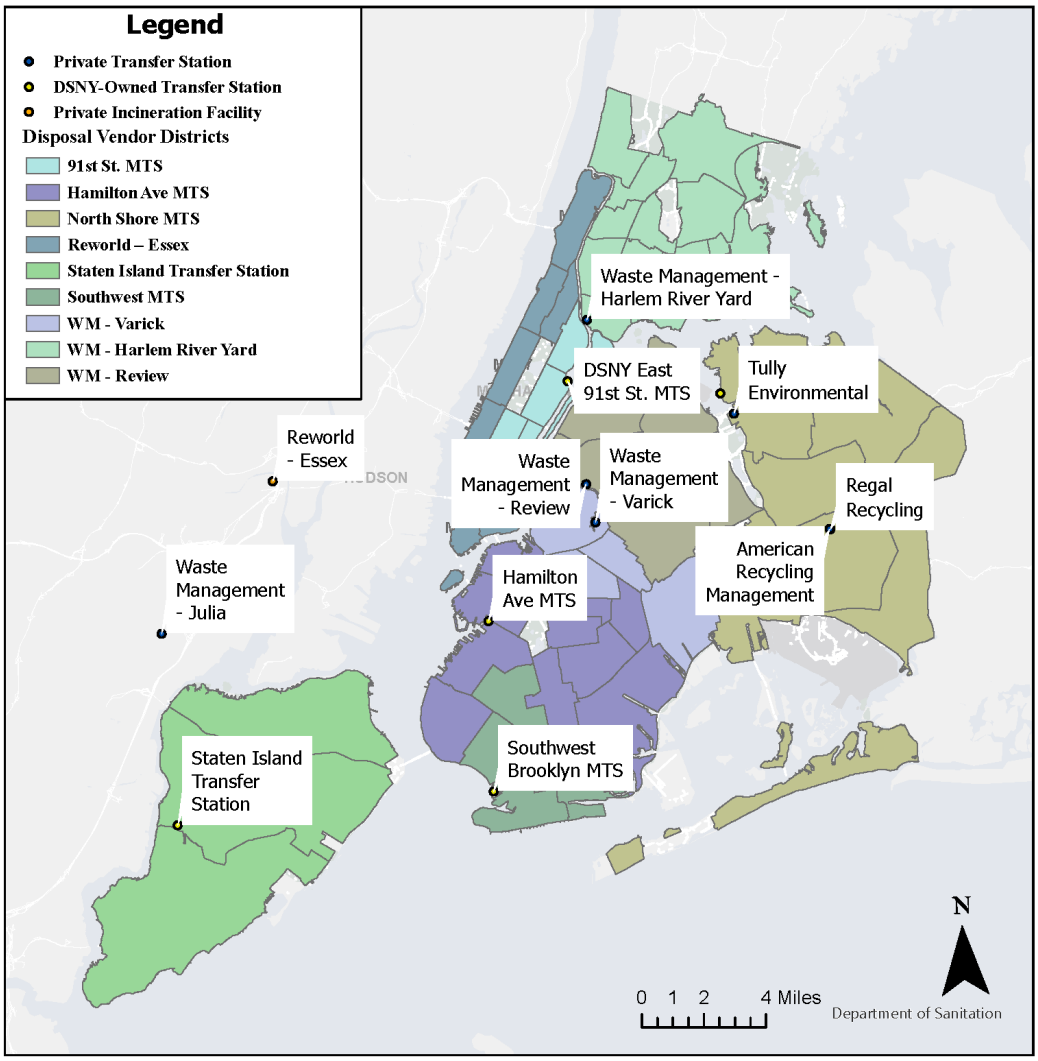


Table 2 lists the 14 private transfer stations in New York City that accepted putrescible waste (waste) in 2023. It includes the annual throughput (tonnage) accepted from DSNY, annual throughput accepted from private haulers (commercial throughput), total throughput, and total permitted capacity calculated from the permitted daily capacity, assuming 312 days of operation.

Table 2. New York City Putrescible Private Transfer Stations, 2023

Facility Name*	Location	DSNY Throughput (TPY)	Commercial Throughput (TPY)	Total Throughput (TPY)	Total Capacity (TPY)**
Action Environmental Systems	Bronx	0	424,123	424,123	468,312
Metropolitan Transfer Station	Bronx	0	145,711	145,711	172,536
Waste Management (Harlem River Yard)* **	Bronx	593,643	59,627	653,270	1,248,000
Action Environmental	Brooklyn	0	111,260	111,260	117,000
Brooklyn Transfer	Brooklyn	0	59,725	59,725	69,888
Hi-Tech Resource Recovery	Brooklyn	0	68,106	68,106	66,768
Waste Connections (Court St.)****	Brooklyn	0	111,181	111,181	232,440
Waste Connections (50th St.)****	Brooklyn	0	142,738	142,738	335,400
Waste Management (Scott Ave)	Brooklyn	0	216,415	216,415	237,432
Waste Management (Varick Ave)	Brooklyn	322,712	39,875	362,587	1,326,000
American Recycling	Queens	11,219	117,448	128,667	177,840
Regal Recycling	Queens	7,511	99,231	106,742	106,704
Tully Environmental	Queens	51,702	80,724	132,426	435,240
Waste Management (Review Ave)	Queens	292,915	-	292,915	655,200
Total	**NYC**	**1,279,701**	**1,676,164**	**2,955,865**	**5,648,760**

Notes:
*Transfer stations noted in **bold** accepted DSNY-collected waste in 2023.
**The total annual capacities are calculated from the permitted daily capacities, assuming 312 operating days.
***Waste Management Harlem River Yard was previously USA Waste Services of NYC.
****Waste Connections transfer stations were previously owned by IESI NY.
The throughput shown here includes putrescible commercial and DSNY-managed waste. It does not include source separated organics or other material. The permitted capacity included here does not include capacity reserved for source separated organics.
Source: 2023 Private Transfer Station Reports to DSNY

Anticipated Waste Transfer Capacity

As shown in **Table 2**, based on the total annual throughput and the total permitted capacity for putrescible transfer stations in New York City, approximately 2.7 million tons per year of available capacity remains. In 2023, over 50% of the permitted capacity of New York City's putrescible private transfer stations was used. Approximately 57% of the 2023 throughput at putrescible private transfer stations was received from commercial haulers and 43% from DSNY.

New York City's population is projected to increase from around 8.8 million in 2025 to nearly 9.2 million in 2036. However, with the implementation of the proposed SWMP programs, residential waste generation is expected to decrease from 2026 to 2036, and the amount of residential waste sent for disposal is projected to drop from 3.15 million tons in 2023 to 2.6 million tons in 2036. Commercial waste generation is expected to increase by over 60,000 tons per year from 2026 to 2036, but with the implementation of proposed programs, waste diversion is expected to increase. Projections show the annual commercial waste tonnage sent for disposal dropping from 1.6 million in 2023 to 1.05 million in 2036.

There appears to be sufficient private transfer station capacity for putrescible waste, with around 50% of the annual permitted capacity remaining in 2023, and disposal tonnage expected to drop from 2026-2036. However, the

permitted capacity may be different from operational capacity. The amount of waste a facility is allowed to receive based on its permit may be greater than the amount of waste that can be processed on a regular basis when considering truck queuing and unloading, rail and barge loading, worker schedules, storage capacity, and other factors.

Further, Reworld Essex receives 350,000-400,000 tons of putrescible waste per year collected by DSNY with a contracted capacity of 985,000 tons. The current 20-year contract with Reworld will end in 2032 with no option for contract renewal. Between all of the contracted facilities, there is sufficient contracted/permitted capacity to handle this quantity of material, but DSNY must plan accordingly to ensure that operational capacity is sufficient.

While there is sufficient capacity for putrescible waste citywide, individual facilities may be operating at capacity, or close to capacity. In 2023, seven facilities across the city were operating close or at capacity.

Construction and Demolition (Non-Putrescible and Fill) Transfer Stations

C&D debris is generated as a result of land and infrastructure development or demolition. This includes waste materials such as concrete, brick, soil, wood, wallboard, tile, roofing shingles, and asphalt pavement. Facilities that manage C&D, including transfer stations, are referred to as C&D Debris Handling and Recovery Facilities (CDDHRFs) by DEC. A CDDHRF might store these wastes, process them to extract recyclable or reusable materials, store recovered materials, or carry on any combination of these activities.[11]

DEC regulates C&D facilities through permits and registrations. Registered facilities may accept up to 500 tons per day of uncontaminated C&D debris. Permitted facilities may accept more than 500 tons per day of C&D debris. Permitted facilities do not require accepted material to be designated as uncontaminated. Permitted and select authorized C&D facilities are required to analyze C&D debris samples prior to the reuse of the material. Additional requirements for C&D facilities are described in NYCRR 361.5.[10]

In 2024, 25 C&D facilities were registered and 24 were permitted in New York City by DEC.[12] DSNY regulates C&D transfer facilities in two categories: non-putrescible C&D debris and fill. There were a total of 21 active non-putrescible and 19 fill transfer stations that reported to DSNY in 2023, as listed in **Table 3** and **Table 4. Table 4** also shows the capacity of fill transfer stations.

Table 3. New York City C&D (Non-Putrescible) Transfer Stations, 2023

Facility Name	Borough
A J Recycling	Bronx
Aspha Transfer	Bronx
JD Recycling	Bronx
John Danna & Sons	Bronx
Zevel Transfer	Bronx
Empire Recycling Services (Astoria Carting)	Brooklyn
Atlas Roll-Off	Brooklyn
Brooklyn C&D	Brooklyn
City Recycling	Brooklyn
Cooper Recycling	Brooklyn

Table 3. New York City C&D (Non-Putrescible) Transfer Stations, 2023

Facility Name	Borough
DeCostole Carting	Brooklyn
Scott Ave Recycling	Brooklyn
Point Recycling	Brooklyn
Waste Management of NY	Brooklyn
American Recycling	Queens
Crown Container	Queens
New Style Recycling	Queens
Regal Recycling	Queens
Thomas Novelli Contracting	Queens
Staten Island C&D LLC	Staten Island
North Shore Waste Solutions LLC	Staten Island
Source: Private Transfer Station Reports to DSNY	

Table 4. New York City Fill Transfer Station Storage Capacity, 2023

Facility	Borough	Capacity (Tons)
Castle Hill Recycling	Bronx	21,840
New York Recycling	Bronx	22,400
Petro Recycling	Bronx	1,680
Allocco Recycling	Brooklyn	11,946
Keyspan Energy (National Grid)	Brooklyn	11,200
Con Edison	New York	280
Durante Brothers	Queens	16,460
Evergreen Recycling of Corona	Queens	44,800
Hunters Point Recycling	Queens	4,480
Maspeth Recycling	Queens	33,600
New York Paving	Queens	560
Russo Recycling Company/Whip Russo Realty Corp	Queens	22,400
Faztec Industries	Staten Island	100,800
J. Bruno & Sons	Staten Island	44,800
South Shore Recycling	Staten Island	28,000
T.M. Maintenance	Staten Island	28,000
Vanbro (Richmond Recycling)	Staten Island	224,000
Source: Provided by DSNY in cubic yards and converted to tons using a factor of 1.12 tons per cubic yard, based on DEC conversion factor for fill.		

In 2018, the non-putrescible and fill facilities in New York City received approximately 6.8 million tons of material. By 2023, that number decreased to less than 5.3 million tons, potentially due to trends in economic activity and construction.[6] Recycled C&D debris and fill can be used in construction. Fine (dust-sized) material that results from demolition can be screened at C&D processing facilities, but it has low potential for beneficial use in new construction and is therefore often used as alternative daily cover (ADC) at landfills.

City-Managed Construction & Demolition Debris

C&D debris generation and recycling rates are largely dependent on economic activity, regulations, and construction sector activity. Most C&D debris in New York City is handled exclusively by the private sector. However, the New York City Department of Transportation (NYCDOT) and Mayor's Office of Environmental Remediation (MOER) run programs to recycle or reuse C&D material generated on City-agency projects.

MOER facilitates the recovery and reuse of clean soil through the Clean Soil Bank, which promotes the exchange of clean soil. Clean soil is stored at the Forbell Street Stockpile in Brooklyn when it cannot be delivered directly between locations. The stockpile can hold up to 18,000 cubic yards of clean soil.

NYCDOT operates the Asphalt Millings Bank and recycled concrete aggregate (RCA) programs.[13] Asphalt is recycled at NYCDOT's Harper and Hamilton Plants. Together, these facilities have processed an average of approximately 290,000 tons of recycled asphalt pavement (RAP) per year from 2016 to 2023. Through the RCA programs, concrete is crushed and screened at NYCDOT's facility for reuse. Over 35,000 tons (or 26,250 cubic yards) were recycled through the program in 2023.

Local Law 152

Local Law 152 of 2018 (LL152), also known as the Waste Equity Law, was passed in August 2018. LL152 required DSNY to reduce the permitted capacity of each transfer station in four community districts as follows:[5]

- Brooklyn Community District 1: by 50%
- Queens Community District 12: by 33%
- Bronx Community Districts 1 and 2; by 33%

The transfer stations considered in developing LL152 (private putrescible and non-putrescible transfer stations) are listed in **Table 5**, with the affected facilities highlighted. This law aimed to reduce air and noise pollution from truck travel through the identified neighborhoods.

LL152 allowed exceptions in capacity reductions for activities such as processing recyclables, processing organic waste, and diverting construction and demolition debris. LL152 also exempted facilities within the affected districts that have on-site rail access, including Harlem River Yard and the Waste Management Varick Avenue transfer station. LL152 also allowed facilities to reserve up to 20% of their total permitted 2019 capacity for source-separated organics (SSO) and qualify that reserved capacity for SSO for exemption from LL152 capacity reductions. Of the facilities affected by LL152, four opted to reserve capacity for SSO. Facilities that did not opt for the SSO exemption in 2019 are still eligible for the 20% capacity bonus for the exclusive management of organics; however, the 20% will be calculated in the total transfer station capacity remaining after the 2019 reduction. Additionally, this reduction was imposed by the City, so a transfer station's permitted capacity according to DEC may be higher.

The reductions in permitted capacity required by LL152 were implemented at the time of annual permit renewal beginning October 1, 2019. The putrescible and non-putrescible capacity in 2019 prior to LL152 reductions was 45,449 tons per day. The remaining putrescible and non-putrescible capacity in 2020 was 35,322 tons per day. The overall capacity reduction at putrescible and non-putrescible private transfer stations was approximately 22%: around 12.5% at putrescible transfer stations and 31.5% at non-putrescible transfer stations.

Table 5. Local Law 152 Transfer Station Capacities 2019 – 2024

Community District	Transfer Station Name	Permitted Capacity 9/30/2019 (TPD)	Permitted Capacity 9/30/2020 (TPD)	Reserved for SSO 9/30/2020 (TPD)	Permitted Capacity 09/2024 (TPD)	Change in Permitted Capacity (2019-2020) (TPD)
Putrescible transfer stations						
BX01	Action Environmental Systems	2,999	2,101	0	2,101	- 898
BX02	IESI NY Corp. (Waste Connections, Casanova St.)	225	166	45	166	- 59
BX02	Metropolitan Transfer Station	825	553	0	553	- 272
BX01	Waste Management (Harlem River Yard, Lincoln Ave.)	4,000	4,000	0	4,000	0
BK05	Action Environmental	375	375	0	375	0
BK01	Brooklyn Transfer	560	336	112	336	- 224
BK01	Hi-Tech Resource Recovery	500	314	100	314	- 186
BK06	IESI NY Corp. (Waste Connections, Court St.)	745	745	0	745	0
BK07	IESI NY Corp. (Waste Connections, 50th St.)	1,075	1,075	0	1,075	0
BK01	Waste Management (Scott Ave.)	1,500	793	0	761	- 707
BK01	Waste Management (Varick Ave.)	4,250	4,250	0	4,250	0
QN02	A & L Cesspool Service	80	80	0	80	0
QN12	American Recycling	850	570	0	570	- 280
QN12	Regal Recycling	600	462	120	462	- 138
QN07	Tully Environmental	1,395	1,395	0	1,395	0
QN02	Waste Management (Review Ave.)	2,100	2,100	0	2,100	0
Total Putrescible		**22,079**	**19,315**	**377**	**19,283**	**-2,764**
Non-putrescible transfer stations						
BX02	A J Recycling	1,200	852	0	852	348
BX02	JD Recycling	330	234	0	234	96
BX02	John Danna & Sons	405	282	0	282	123
BX02	Aspha	750	503	0	503	247
BX02	Zevel Transfer	1,050	738	0	738	312
BK01	Empire Recycling	300	173	0	173	127

Table 5. Local Law 152 Transfer Station Capacities 2019 – 2024

Community District	Transfer Station Name	Permitted Capacity 9/30/2019 (TPD)	Permitted Capacity 9/30/2020 (TPD)	Reserved for SSO 9/30/2020 (TPD)	Permitted Capacity 09/2024 (TPD)	Change in Permitted Capacity (2019-2020) (TPD)
BK05	Atlas Roll-Off	1,125	1,125	0	1,125	0
BK01	City Recycling	1,500	866	0	866	634
BK01	Cooper Recycling (Tank & Welding)	1,875	999	0	999	876
BK17	DeCostole Carting	750	750	0	750	0
BK01	GADS	1,088	701	0	701	387
BK01	Brooklyn C&D	1,350	684	0	684	666
BK01	Point Recycling	300	166	0	166	- 134
BK01	Waste Management (Thomas St)	1,500	750	0	750	- 750
BK01	Cooper Recycling	5,250	2,829	0	2,829	- 2,421
QN12	American Recycling	150	101	0	101	- 49
QN07	Crown Container	375	375	0	375	0
QN05	New Style Recycling	337	337	0	337	0
QN12	Regal Recycling	266	191	0	191	- 75
QN12	Thomas Novelli Contracting	375	257	0	257	- 118
SI01	Flag Container Services	2,250	2,250	0	2,250	0
SI01	Stokes Waste Paper (North Shore Waste Solutions)	850	850	0	850	0
Total Non-Putrescible		**23,370**	**16,007**	**0**	**16,013**	**-7,363**
TOTAL		**45,449**	**35,322**	**377**	**35,296**	**- 10,127**

Notes:
TPD – tons per day; SSO – source separated organics; P – putrescible; NP – non-putrescible.
Permitted capacity did not change between September 2020 through September 2023.
Highlighted rows indicate transfer stations whose capacity was reduced (within the community districts affected by Local Law 152).
Highlighted rows indicate transfer stations that were exempt from Local Law 152 capacity reduction because they export accepted waste by rail.
Sources: Local Law 152, 2018 Waste Equity Law; Local Law 152 Annual Reports[5]

Landfills

Over half of the MSW generated in the United States (nearly 150 million tons in 2018) is disposed at landfills.[14] At the bottom of the EPA waste hierarchy, landfills produce the greenhouse gases (GHGs) methane and carbon dioxide as materials decompose. Landfills are designed, built, operated, regulated, and monitored to minimize the effect of GHGs on the climate and other adverse environmental impacts.[15,16]

Modern landfills use liners, leachate collection, and groundwater monitoring systems to mitigate groundwater and soil contamination. They also have various controls in place to reduce litter, odor, and operational noise. The GHG mixture produced at landfills, known as biogas or landfill gas, can be captured and used as fuel, sometimes referred to as renewable natural gas (RNG).[15]

MSW landfills in New York State are permitted to accept residential, commercial, and/or institutional waste. There are no landfills currently accepting waste in New York City. The city's last active landfill was Fresh Kills in Staten Island, which accepted waste from 1948 through 2001 and was designated as the world's largest landfill. Parts of this former landfill are being converted into a park.[17]

Since the closure of incinerators in the 1990s, the city has depended on the export of waste to regional landfills.[8] From 2015 to 2023, DSNY sent material to landfills in New York State, New Jersey, Pennsylvania, Ohio, Kentucky, Virginia, and South Carolina. Around 7,300 tons per day of DSNY-collected waste were landfilled in 2023, making landfills the primary disposition method for New York City's residential MSW.[7] While the generation and disposal of waste should be reduced, DSNY must ensure that sufficient landfill capacity for DSNY-managed materials will be available until the transition to more sustainable waste management is completed. Failure to adequately plan for waste management capacity could result in major adverse health, environmental, and economic impacts to the city.

Landfill Capacity Methodology

Data on regional landfill capacity was compiled from EPA's Landfill Methane Outreach Program Landfill and Landfill Gas Energy Database.[18] The LMOP Database tracks MSW landfills and landfill gas energy projects as part of the Landfill Methane Outreach Program, which encourages the collection and beneficial use of methane, or biogas, generated from MSW. Information from the database was supplemented with other sources, including compiled landfill data from DEC, environmental agencies for other states, and information published on landfill operator websites. Additional landfills identified through DSNY's internal datasets were also included in the capacity analysis. Landfills used for the disposal of privately-managed New York City waste were identified from data in 2014-2018 private carter surveys and reports and 2016-2021 C&D facility annual reports to DEC. While there is information on how much waste DSNY sends to each landfill, data on the quantity of waste sent out by private transfer stations is incomplete and was not used for the capacity analysis.

The LMOP Database contains information on landfill design capacity, the amount of waste in place, and the annual waste acceptance rate (all reported in tons). This information was used to estimate the annual capacity and the total remaining capacity of the landfills. The 2023 New York State Solid Waste Management Plan (SWMP) includes updated information on annual permitted capacity and remaining capacity for landfills within New York State. Capacity data from the SWMP was used instead of the capacity data in the LMOP Database for the analysis of landfill capacity in New York State.[19]

The other source of data for the annual capacity calculation was the annual waste acceptance rate included in the LMOP Database, which is generally lower than the maximum permitted acceptance rate. Daily permitted capacities

for landfills within Pennsylvania were available from the Pennsylvania Department of Environmental Protection (PADEP). Daily capacities were converted to annual capacities and vice versa, as needed. The estimated remaining capacity was calculated by subtracting the amount of waste in place from the design capacity. For landfills for which the amount of waste in place or design capacity were not available, the remaining capacity was not calculated. Capacity for closed landfills and landfills with known restrictions (those that only accept in-county or regional waste or that exclude New York City) was not included in total capacity calculations.

Information on the materials accepted by each landfill was obtained from State environmental agencies and facility company websites when needed. While the LMOP Database catalogs MSW landfills, some facilities identified in the LMOP Database or in New York City waste datasets currently only accept C&D debris or other waste types, based on available information from State agencies or other official sources. Landfills that do not accept MSW are not included in this analysis unless they appeared in New York City waste datasets or the LMOP Database.

It is important to note that annual and total remaining landfill capacity figures may change. This is because landfills often expand or incoming volumes contract, permits may be changed to increase or restrict capacity, and landfills may be forced to close or pause operations due to noncompliance with environmental regulations.

Estimated Accessible Landfill Capacity by State

The assessment of available landfill capacity for New York City's waste disposal includes landfills both within and outside of New York State. Between 2015 and 2023, DSNY's MSW vendors sent material for disposal to facilities in the following states:[20,21,22,23,24]

- Kentucky
- New York
- Ohio
- Pennsylvania
- South Carolina
- Virginia

Data was also compiled on landfills in the Northeast region and around the southern states where New York City currently sends waste. In prior years DSNY has also sent waste to landfills in Georgia and Alabama. Those facilities were included in the capacity analysis, but other landfills in Georgia and Alabama (that DSNY has not used) were not included due to their distance from New York City.

As shown in **Table 6**, Ohio, Pennsylvania, Virginia, New York, and North Carolina have the largest number of landfills and estimated annual landfill capacity. Ohio has the largest remaining accessible capacity, followed by Virginia, Pennsylvania, and Kentucky.

Table 6. Annual and Remaining Capacity by State

Landfills by State	Number of Landfills	Annual Accessible Capacity (Million Tons)	Remaining Accessible Capacity (Million Tons)	Remaining Capacity Years*
Ohio	40	19.7	690	35
Pennsylvania	47	19.4	483	25
Virginia	44	14.2	374	26
Kentucky	24	7.4	233	32
South Carolina	16	6.2	222	36
New York	30	13.1	199	15
North Carolina	40	11	152	14
West Virginia	19	2.1	82	39
Alabama	1	0.7	58	82
Maryland	20	2.3	57	25
New Jersey	13	3.1	55	17
Georgia	2	0.7	50	71
New Hampshire	7	2.1	27	13
Vermont	1	0.6	12	21
Maine	7	0.4	10	23
Massachusetts	8	0.8	5	6
Connecticut	2	0.2	0	0
Delaware	3	0	0	0
Rhode Island	1	0	0	0
Total	**326**	**104**	**2,709**	**25**

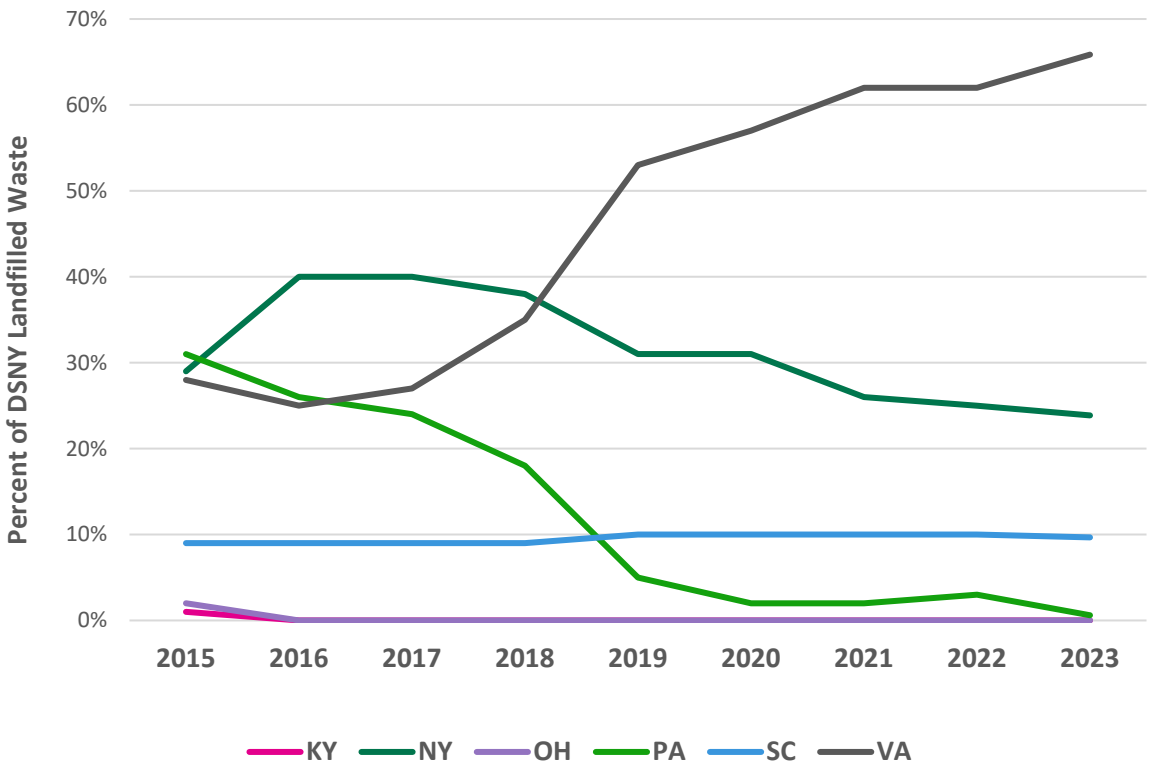
Note: *Remaining capacity years was calculated by dividing the remaining capacity by the annual capacity for an estimate of the number of years before all landfills in the state reach capacity. The capacity tonnage does not include the capacity of landfills with known municipal restrictions on waste acceptance. Most of the annual accessible capacity data was derived from the "annual waste acceptance rate" included in the EPA Landfill Methane Outreach Program Landfill and Landfill Gas Energy (LMOP) Database, so this may not reflect the remaining capacity if landfills operate at full permitted capacity. This estimate does not account for waste reduction projections, landfill expansions or planned closures, additional capacity restrictions, or other factors.
Sources: LMOP Database[25] and New York State Department of Environmental Conservation (DEC) Solid Waste Management Plan[26]

New York State is projected to exceed its current MSW landfill capacity within 16 to 25 years. If all landfills accepted the annual tonnage allowed by their permit, and municipal waste acceptance restrictions were factored in, New York State's remaining landfill capacity for MSW would be 16 years. If the waste acceptance rates in 2018 were maintained for each landfill, the state's landfills would reach capacity in 25 years.[19]

Landfill capacity in the states analyzed in **Table 6** will be used in approximately 25 years based on annual acceptance rates and the total remaining capacity. If waste generation is not reduced, existing landfills will need to be expanded and/or more landfills will need to be developed. Both options are likely to be opposed by nearby communities (landfills are generally, disproportionately located in low-income or minority communities) due to environmental and public health concerns.

As shown in **Figure 4**, from 2015 to 2023, DSNY vendors decreased the amount of MSW sent to in-state landfills and increased long-distance export of waste to landfills. In 2023, only 24% of waste managed by DSNY was sent to New York State landfills, compared to around 40% from 2016 to 2018. The quantity of waste exported to Virginia facilities more than doubled between 2017 and 2023.[21,22,23,24]

Figure 4. DSNY-Collected Waste Disposal by State



Source: *DSNY Biennial SWMP Reports 2015-2022, NYC Waste Disposal OpenData*

Since 2015, DSNY vendors have not sent any waste to landfills in Massachusetts, New Hampshire, Connecticut, Vermont, or Maine. This is likely due to limited landfill capacity in these states, as described below:

- A 2019 Massachusetts Department of Environmental Protection study found that in-state landfill capacity for both MSW and C&D debris would be almost completely depleted by 2027. The State's *Solid Waste Master Plan* notes that material recovery facilities (MRFs) and incineration facilities are also operating at full capacity.[27,28]

- Connecticut has no active MSW landfills; the two landfills included in **Table 6** accept only C&D debris and special waste. Connecticut relies on incinerator facilities and out-of-state export to dispose of waste. As incinerator facilities age and shut down, capacity decreases further. The Connecticut Department of Energy & Environmental Protection has referred to these conditions as a waste crisis. Due to Connecticut's proximity to New York City, this may affect accessible capacity for the city's waste.[29]
- In Rhode Island, municipalities are required to dispose of all residential waste at the Rhode Island Resource Recovery Corporation (RIRRC)'s Central Landfill. Central Landfill's low tipping fees result in the majority of Rhode Island's public and privately-managed waste being disposed of at the site. The landfill is expected to reach capacity near 2034. RIRRC does not accept out-of-state waste.[30]
- In New Hampshire, disposal capacity is expected to plummet far below the state's projected waste disposal needs when the TLR-III landfill closes in 2036. Nearly half of the waste disposed in New Hampshire is generated out of state.[31]
- Vermont has only one operating landfill, Casella's NEWSVT Landfill in Coventry, which accepts much of Vermont's waste. Casella's NEWSVT Landfill also accepts out-of-state waste. The facility is expected to reach capacity in 20 years, prompting Vermont to explore alternative options for waste disposal. Options for expanding the landfill or opening additional landfills in Vermont are limited due to operational or environmental viability (for example, an expansion at the NEWSVT landfill would encroach on wetlands).[32]
- Maine does not have major landfill capacity concerns. However, the majority of the state's landfills are municipally owned and only accept waste generated locally or in state.[33]

New York State Landfills

In 2025, there were 25 permitted MSW landfills in New York State. Five only accept in-county waste, so there is no accessible capacity for New York City's MSW at those facilities. Landfills with local or state restrictions are still included in the capacity data and in the count of landfills in each state in **Table 6**.

The landfills shown in **Table 7** accepted waste from New York City from 2015 to 2023. Seneca Meadows, and High Acres accepted MSW from DSNY's vendors. The other landfills in the table were included in DSNY Private Carter Surveys and C&D Processor Annual Reports submitted to DEC.

Two of the landfills listed in **Table 7** are pending closure. The Brookhaven landfill and Seneca Meadows landfill were slated to close in 2024 and 2025 respectively but have not closed as of August 2025.

The New York State landfills in **Table 8** were not used for DSNY-managed waste between 2015 and 2023. Capacity data on these landfills was obtained from DEC's 2023 SWMP. These landfills are active (as of 2023) and do not have explicit restrictions on accepting out-of-county waste, but they do have low annual capacity throughputs, making them less attractive to high-volume generators such as New York City. Broome County Landfill, Cortland County Sanitary Landfill, Delaware County Landfill, Madison County Landfill, and the Town of Colonie Sanitary Landfill are currently open but only accept in-county waste, so their capacity is not included in this analysis.

Table 7. New York State Facilities that Received New York City Waste, 2015-2023

Landfill Name	Owner	Planned Closure Year	Waste Type	Annual Capacity (Tons)	Remaining Capacity (Tons)	Capacity Data Year
110 Sand Company	Private	-	C&D	831,663	1,600,255	2021
Ava Landfill	Municipal	2089	MSW, C&D, Biosolids, Special	312,000	23,572,567	2023
Fulton County Landfill	Municipal	2059	MSW, C&D, Biosolids, Special, Organics	180,000	7,605,735	2023
Green Ridge Landfill	Private	2030	MSW, C&D, Biosolids, Special	375,500	3,879,151	2023
Hakes C&D Landfill	Private	-	C&D	466,000	1,083,037	2023
High Acres Landfill	Private	2053	MSW, C&D, Organics, Special, Biosolids	1,074,500	41,480,000	2023
Hyland Landfill	Private	2029	MSW, C&D, Biosolids, Special	465,000	6,661,122	2023
New Bath Landfill	Municipal	2026	MSW, C&D, Special	151,500	941,528	2023
Ontario County Sanitary Landfill	Municipal	2028	MSW, C&D, Biosolids, Special	1,200,000	7,460,144	2023
SA Dunn Landfill	Private	-	C&D	400,000	264,208	2023
Seneca Meadows Landfill	Private	Unknown	MSW, C&D, Organics, Biosolids, Special	2,190,000	14,375,530	2023
Town of Brookhaven Landfill	Municipal	1990 (MSW); Unknown (all)	C&D, Biosolids	577,048	-	Unspecified
Total				**8,640,211**	**115,014,095**	

Sources:
New York State Department of Environmental Conservation (DEC) Draft Solid Waste Management Plan, EPA Landfill Methane Outreach Program Landfill and Landfill Gas Energy Database (LMOP Database), C&D Processor Annual Reports to DEC.

Table 8. New York State Landfills Not Receiving New York City Waste

Landfill Name	Ownership Type	Planned Closure Year	Waste Type	Annual Capacity (Tons)	Remaining Capacity (Tons)	Capacity Data Year	Distance From NYC (Miles)
Albany Landfill/ Rapp Road Landfill	Municipal	2026	MSW, C&D	275,100	1,758,652	2023	200
Bristol Hill Sanitary Landfill	Municipal	2046	MSW	100,000	2,308,250	2023	300
Chaffee Landfill/ CID Landfill	Private	2027	MSW, C&D, Biosolids, Special	600,000	4,347,000	2023	300
Chautauqua County Landfill/ Ellery Sanitary Landfill	Municipal	2030	MSW, C&D, Biosolids, Special	408,000	7,214,877	2023	300
Chenango County Landfill/ Pharsalia Landfill	Municipal	Unknown	MSW, C&D, Biosolids, Special	41,550	1,527,951	2023	200
Clinton County Regional Landfill/ Schuyler Falls Landfill	Municipal	2030	MSW, C&D	250,000	3,440,162	2023	300
DANC Solid Waste Management Facility	Municipal	2074	MSW, C&D	346,320	12,586,516	2023	300
Franklin County Regional Landfill/ CFSWMA* Landfill	Municipal	2035	MSW, C&D, Biosolids	125,000	1,591,812	2023	300
Mill Seat Landfill Riga	Municipal	2060	MSW, C&D, Special	598,650	28,907,100	2023	300
Modern Landfill, Inc.	Private	2038	MSW, C&D, Special	815,000	15,773,600	2023	>300
Niagara Falls Landfill/ Allied Waste Niagara Falls Landfill	Private	2025	MSW, C&D Special	800,000	4,115,890	2023	>300
Total				**4,359,620**	**83,571,810**		

*CFSWMA – County of Franklyn Solid Waste Management
Sources: New York State Department of Environmental Conservation (DEC) Draft Solid Waste Management Plan; EPA Landfill Methane Outreach Program Landfill and Landfill Gas Energy Database (LMOP Database)

Out-of-State Landfills

From 2015 to 2023, DSNY exported material to the out-of-state landfills shown in **Table 9**. All landfills in **Table 9** are privately owned and accept MSW. The Grows North Landfill and Tullytown Landfill both closed in 2017 but are located near the Fairless Landfill, which is open (as of 2025) and accepting waste.

The average planned closure year for the landfills included in **Table 9** is 2052. However, if waste were to continue being accepted at the current annual rate, capacity is estimated to be depleted by 2040. Most of the waste sent to out-of-state landfills by DSNY vendors in 2023 went to the Maplewood Landfill, Atlantic Waste Disposal Landfill, and Lee County Landfill.

Table 9. Out-of-State Landfills Receiving DSNY Waste, 2015-2022

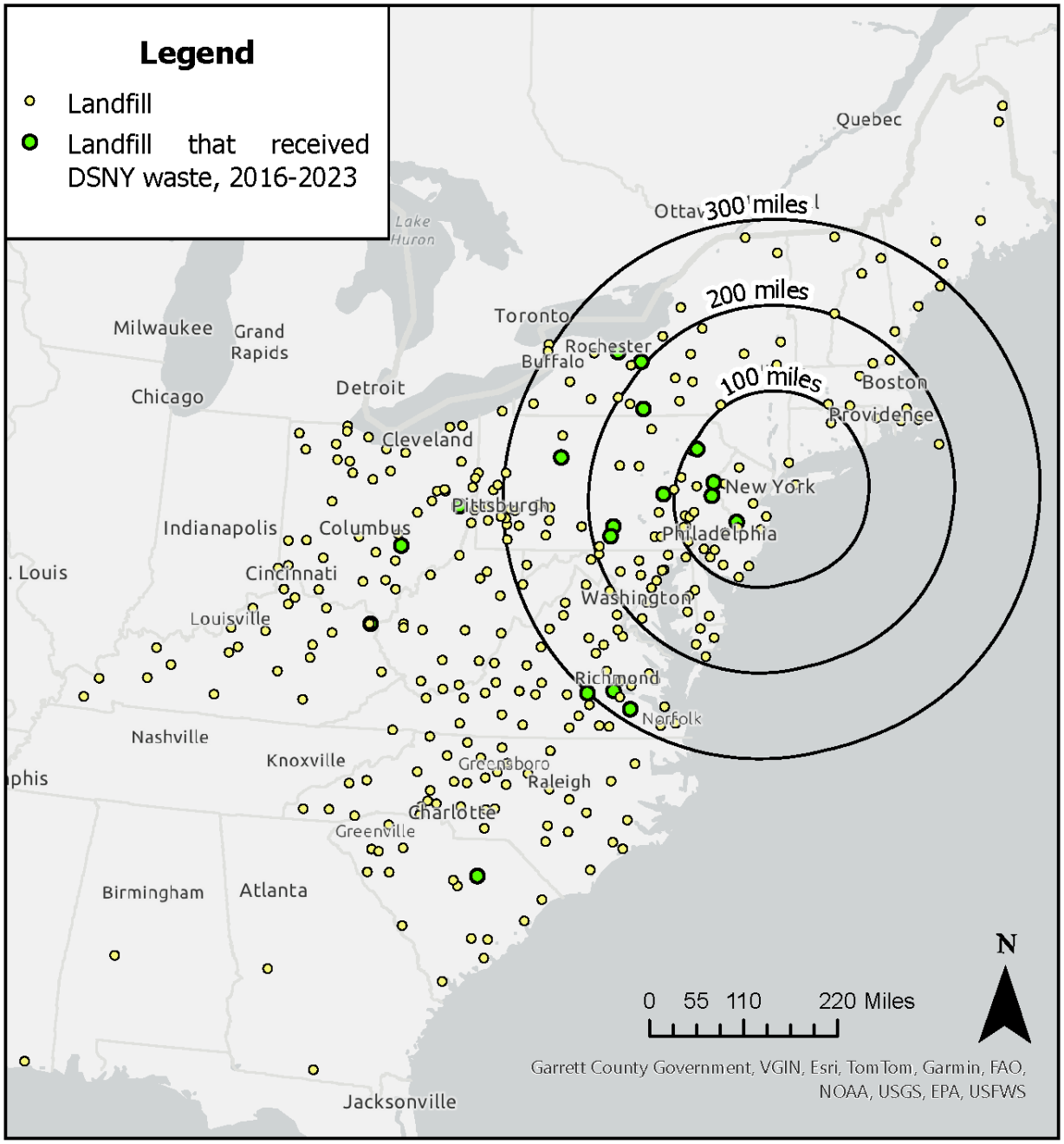
Landfill Name	State	Planned Closure Year	Waste Type	Annual Capacity (Tons)	Remaining Capacity (Tons)	Capacity Data Year	Within Distance from NYC (Miles)
Big Run (Boyd County Sanitary Landfill)	KY	2109	MSW	445,204	34,937,034	2022	>300
Apex Environmental Resources	OH	2037	MSW	2,551,858	49,855,125	2022	>300
Tunnel Hill Reclamation	OH	2031	MSW; Special; Biosolids	1,867,310	13,459,803	2022	>300
Fairless	PA	2028	MSW	3,590,675	19,582,613	2020	100
Bethlehem	PA	2025	MSW; C&D	415,430	2,151,590	2022	100
Grand Central (GCS)	PA	2029	MSW	702,245	324,351	2022	100
Keystone Sanitary Landfill	PA	2067	MSW	1,947,017	99,503,886	2022	100
Blue Ridge	PA	2035	MSW	727,116	9,905,209	2022	200
Cumberland County	PA	2032	MSW	282,880	3,754,292	2022	200
Commonwealth Environmental Systems	PA	2028	MSW	464,068	13,318,620	2010	200
Greentree	PA	2065	MSW	533,330	33,028,848	2022	300
Lee County	SC	2054	MSW; Organics	539,748	16,793,046	2022	>300
Shoosmith Sanitary Landfill	VA	2024	MSW; C&D; Special	860,462	7,939,255	2022	300
Atlantic Waste Disposal	VA	2101	MSW; C&D; Biosolids; Special	1,114,145	92,644,120	2022	200
Maplewood	VA	2090	MSW; C&D; Special	916,127	26,368,970	2022	>300
Grows North (closed)	PA	2017	-	N/A	N/A	2016	100
Tullytown (closed)	PA	2017	-	N/A	N/A	2017	100
Total				**16,957,615**	**423,566,762**		

Sources: New York State Department of Environmental Conservation (DEC) Draft Solid Waste Management Plan (March 2023)**;** EPA Landfill and Landfill Gas Energy Database (LMOP Database[25])

Landfills by Distance from New York City

In 2022, DSNY-managed waste was transported to landfills from 90 miles to nearly 700 miles away from New York City. **Figure 5** and **Table 11** show private and public landfills with 100-, 200-, and 300-mile buffers from New York City's borders to analyze landfill distance. Note that the analysis does not factor in routing, and accessing landfills may require more transport than indicated by distance from the city.

Figure 5. Landfill Distance from New York City



Of the 326 open landfills compiled for this analysis, only 33 landfills are within 100 miles of New York City. 55 landfills are between 100 and 200 miles of the city, and 59 are between 200 and 300 miles. Over half of the landfills are over 300 miles away, but those may be suitable for long-term export via rail.

Privately owned landfills are more likely to have capacity for non-local MSW, as municipal landfills often use much of their capacity for local municipalities and in-state generated waste. The landfills listed in **Table 10** are within 300 miles of New York City and have remaining capacity but access to these landfills for New York City waste is unrealistic.

Table 10. Privately-Owned Municipal Solid Waste Landfills Within 300 Miles of New York City

Landfill Name and Distance	State	Annual Capacity (TPY)	Remaining Capacity (Tons)
Within 100 miles of NYC	**Total**	**8,388,222**	**149,973,827**
Alliance Landfill	PA	688,566	23,629,970
Bethlehem Landfill*	PA	415,430	2,151,590
Chrin Brothers LF	PA	193,720	3,514,137
Fairless Landfill*	PA	3,590,675	19,582,613
Grand Central Landfill (GCS)*	PA	702,245	324,351
Keystone Sanitary Landfill*	PA	1,947,017	99,503,886
Ocean County LF	NJ	583,388	1,267,280
Western Berks Community Landfill & Recycling Center	PA	267,181	NA
Within 200 miles of NYC	**Total**	**4,377,395**	**130,074,491**
Atlantic Waste Disposal Landfill*	VA	1,114,145	92,644,120
Blue Ridge Landfill*	PA	727,116	9,905,209
Commonwealth Environmental Systems Landfill*	PA	464,068	13,318,620
Cumberland County Landfill*	PA	282,880	3,754,292
Fitchburg-Westminster LF	MA	354,174	1,283,339
Green Ridge Landfill	NY	375,500	3,879,151
Middleborough Landfill	MA	75,411	219,493
Modern LF	PA	984,101	5,070,267
Within 300 miles of NYC	**Total**	**12,172,971**	**334,847,088**
Bethel LF	VA	764,053	31,246,369
Chaffee LF	NY	600,000	4,347,000
Charles City County SLF	VA	607,680	24,589,461
Evergreen Landfill	PA	92,585	6,093,475
Greenridge Reclamation Landfill	PA	249,501	1,577,154
Greentree Landfill*	PA	533,330	33,028,848
High Acres Landfill*	NY	1,074,500	41,480,000
Hyland Landfill	NY	465,000	6,661,122
Kelly Run SLF	PA	143,921	451,936
Laurel Highlands LF	PA	105,510	26,491,314
LCS Services Landfill	WV	115,829	5,769,882
McKean County LF	PA	82,841	21,641,693
Middle Peninsula Landfill	VA	488,463	24,855,088
Monroeville LF	PA	405,144	9,562,614
Mostoller Landfill, Inc.	PA	90,290	5,742,095

Table 10. Privately-Owned Municipal Solid Waste Landfills Within 300 Miles of New York City

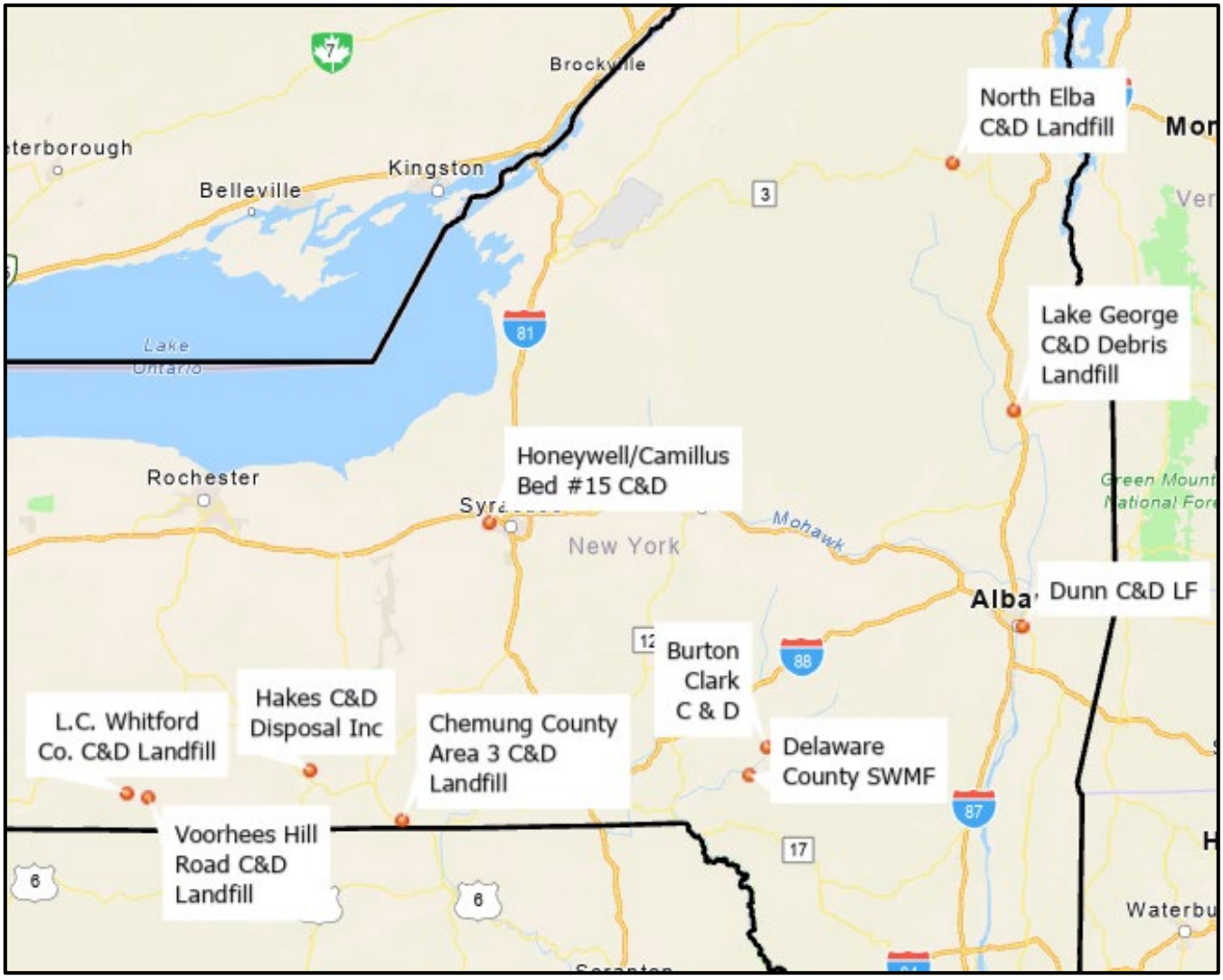
Landfill Name and Distance	State	Annual Capacity (TPY)	Remaining Capacity (Tons)
Mountainview SLF	MD	51,000	126,127
NEWSVT Landfill	VT	569,510	12,053,478
North Country Environmental Services LF	NH	219,801	640,969
Northwest SLF	PA	71,127	269,019
Old Dominion LF	VA	555,262	12,074,583
Seneca Meadows Landfill*	NY	2,190,000	14,375,530
Shoosmith Sanitary Landfill*	VA	860,462	7,939,255
Southern Alleghenies LF	PA	55,391	3,159,268
Turnkey Recycling and Environmental Enterprise (Tree)	NH	1,459,769	18,703,824
Westmoreland Landfill	PA	322,002	21,966,984

Notes:
LF – landfill; SLF –sanitary landfill; TPY – tons per year
Landfill names are reported as listed in the Landfill Methane Outreach Program Database
Asterisks (*) indicate use of landfill by DSNY between 2015-2023
Sources: New York State Solid Waste Management Plan; Landfill Methane Outreach Program Database

C&D Landfills

New York City-generated C&D debris is hauled to transfer stations within the city as well as to facilities or disposition sites in New York, New Jersey, Pennsylvania, Ohio, Virginia, and Alabama.[34] Some C&D debris is transported to landfills that accept only C&D debris. There are no C&D landfills in New York City. In 2025, there were 10 active landfills permitted for C&D disposal in New York State, as shown in **Figure 6**.[35]

Figure 6. New York State C&D Landfills



Source: *New York State Open Data*

Thermal Treatment Facilities

Thermal treatment describes a variety of processes that use combustion to process waste from residential, commercial, or industrial sources. Some thermal treatment facilities may also process regulated medical waste and other special wastes. Thermal treatment processes can include incineration, gasification, pyrolysis, and anaerobic digestion. When energy is recovered for usable heat, electricity, or fuel, thermal treatment processes may be described as waste-to-energy (WTE). The following sections will focus on MSW incineration, gasification, and pyrolysis; current trends in these processes; and the potential for future incineration capacity.[36]

Thermal treatment technology

Incineration

The most common process for waste combustion in the United States, incineration heats unprocessed waste on moving grates in the presence of oxygen.[36] The heat generated from the combustion of the waste is recovered as energy through special boilers. Incineration facilities can produce a net of 550-700 kilowatt hours (kWh) per ton of waste combusted and are 6-11 times more efficient at capturing energy than landfills.[37]

Incinerator efficiency can be increased by joining the facility with a combined heat and power facility. This type of partnership is more common in major urban centers where incineration can provide steam for heating, cooling, and power generation.[36]

Incinerated waste contains approximately 20% non-combustible materials that become byproducts. These by-products include bottom ash, fly ash, and ferrous and nonferrous metals. The metals recovered through incineration can be recycled. Bottom ash and fly ash, also known as ash residue, may contain pollutants but have potential uses as substrates for concrete and construction activities. Ash residue may also be disposed of at certain landfills.[36,37]

Gasification

Gasification uses a high temperature (550 to 1,000 °C), oxygen-limited environment to facilitate a reaction that produces a synthetic gas (syngas) which is then cleaned of toxics and pollutants.[38] After purification, syngas can be used to produce electricity, heat, or steam. Gasification produces several by-products, including tar and other solid residues, wastewater, and air emissions.[36,38]

Gasification is currently used less frequently than traditional incineration; however, it generates fewer emissions and pollutants.[38]

Pyrolysis

Pyrolysis breaks down waste by applying high heat in an oxygen-free environment to.[38,39] Pyrolysis produces several by-products, including biofuel, syngas, tar, char, and ash, as well as air emissions. The specific by-products depend on the composition of the waste.[39]

Generally, pyrolysis produces fewer emissions than incineration and gasification.[39]

Table 11 compares the outputs, benefits, and limits of the incineration, gasification and pyrolysis of waste. These processes are described in more detail in **Attachment H: Review of Advanced Thermal Treatment Technologies.**

Table 11. Comparing Thermal Treatment Processes

Process	Energy recovered	By-products	Emissions	Advantages	Limitations
Incineration	Heat energy	Bottom-ash, fly ash, CO_2, H_20, O_2, N_2, metals	SO_x, NO_x, CO_x, polyaromatic hydrocarbon, dioxin	• Reduces volume and weight of waste. • Recovers metals for recycling. • Potential use for ash as substrates.	• Extensive infrastructure /equipment needs • Heavy metals management in ash
Gasification	Syngas (CH_4, H_2, CO_2, CO, inert gases)	Tar, hydrocarbons, wastewater, solid residues	CO, NO_x, SO_x, hydrocarbons, dioxins, furans	• Reduces volume of waste. • Generates lower emissions of pollutants than incineration.	• Extensive infrastructure /equipment needs • Emerging technology
Pyrolysis	Biofuel, syngas (CH_4, H_2, CO_2, CO)	Char, ash, pyrolysis oil (tar)	H_2S, NH_3, SO_x, NO_x, exhaust gas	• Reduces volume of waste. • Generates lower emissions of pollutants than incineration. • Tar has potential uses as fuel. • Char has potential uses as raw material. • Pyrolysis fuels generally have high caloric value.	• Extensive infrastructure /equipment needs • Challenges with viscosity of oil for use and transport • Emerging technology

Source: "Municipal solid waste management: A review of waste to energy (WtE) approaches," *BioResources* 16(2), 4275-4320

National and International Incineration Trends

Incineration capacity in the United States has decreased in the past several years. From 2018 to 2022, 188 megawatts (MW) of WTE facility capacity was retired from operation and an additional 36 MW is expected to close by 2027, after the industry had held steady since a boom in the early 1990s.[40] A typical WTE plant generates about 550 kilowatt hours (kWh) of energy per ton of waste.[41]

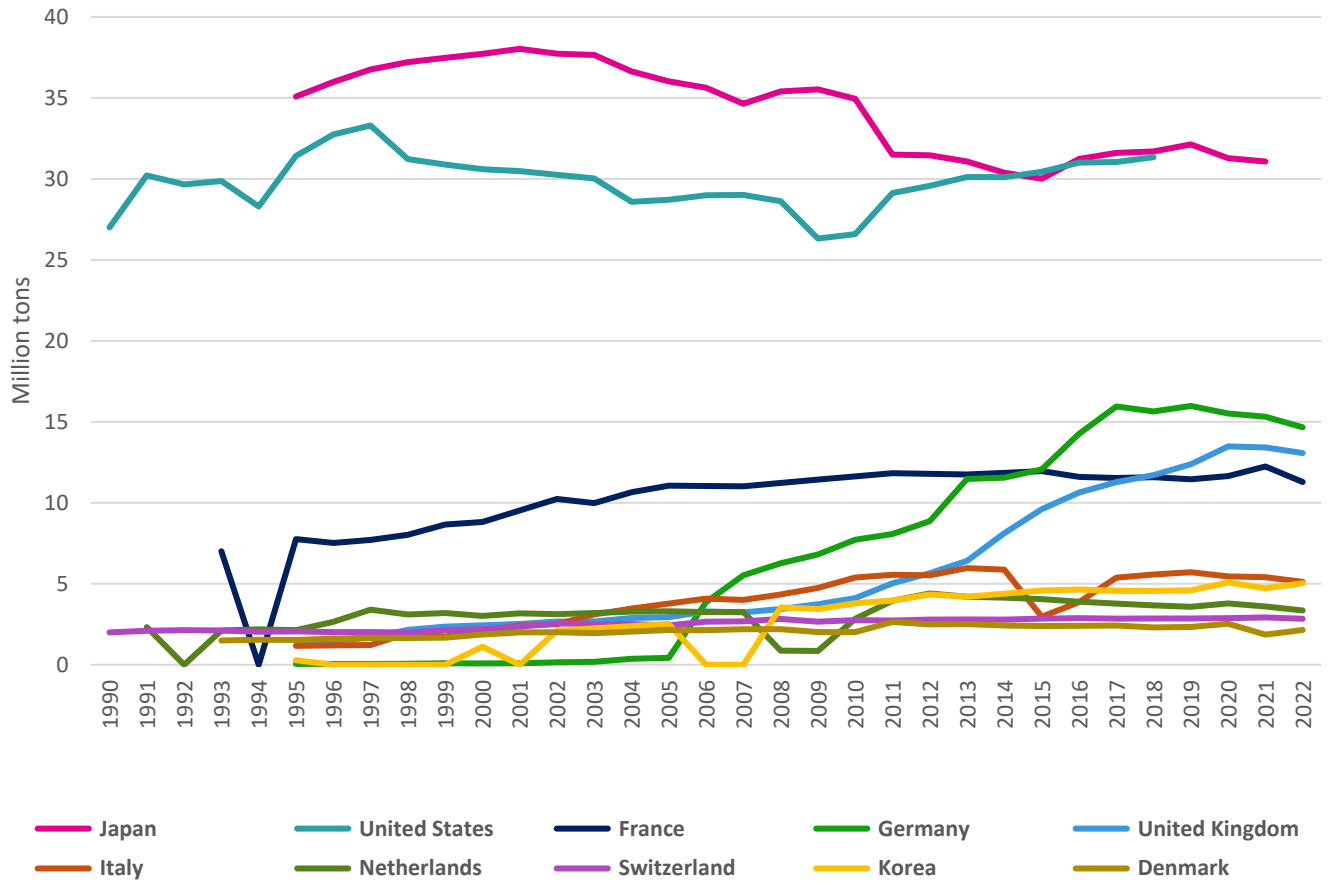
These closures are due to several factors including local opposition, electricity prices, and policy concerns. According to the Organisation for Economic Cooperation and Development (OECD) data, this trend is reflected among global peers as well.[42]

MSW combustion accounts for only 12.8% of waste management in the United States, compared to the more than 50% that gets sent to the landfills according to 2018 data. This is due in part to the large availability of land in the United States. Landfills, although requiring large footprints, generally have a lower up-front cost to establish than incinerators.[43,44]

Small, densely populated countries with limited space for landfills show a greater adoption of incineration technologies. For example, U.S. Energy Information Administration (EIA) data shows the percent of total municipal solid waste that is burned for energy recovery in Japan (75%) and Switzerland (48%) is significantly greater than in

the United States.[45] However, the United States generates more MSW than any other country, leading to higher quantities of tonnage incinerated. **Figure 7** displays OECD data on the annual tonnage incinerated by the ten countries that incinerate the highest quantities of waste with energy recovery. Additionally, China incinerates large quantities of waste (146 million tons in 2020), but it's unclear how much of this is incinerated with or without energy recovery, so this data is not included in **Figure 7**.[46]

Figure 7. Quantity of Waste Managed through Incineration by Country



Historically, incineration facilities have not always had emissions control equipment and can produce harmful emissions even with such controls. Additionally, facilities can generate high volumes of truck traffic. These two factors are among the major community concerns with incineration. Furthermore, a recent study from the Tishman Environment and Design Center at The New School and the Global Alliance for Incinerator Alternatives (GAIA) found that most incinerators in the United States operate in environmental justice communities, adding to the disproportionate environmental burdens that these communities face.[47]

Despite these concerns, developments continue to be made in incineration technologies. The Department of Energy Gasification Systems Program is a federal program focused on developing designs and technologies for gasification

systems to enable low-cost, lower emission, market competitive gasification technologies, including MSW WTE gasification systems.[48]

EPA and state and local authorities provide operational regulations and guidance for incineration facilities and enforce those regulations. The regulations delineate the minimum levels of performance required for federal incineration facilities and recommended for all other waste management jurisdictions. Facilities emitting pollutants are also regulated under the Clean Air Act. The EPA regulates hazardous and non-hazardous waste through the Resource Conservation and Recovery Act (RCRA). RCRA regulations for thermal processing of solid wastes, and solid wastes used as fuels in combustion units, are contained in Title 40 of the Code of Federal Regulations (CFR) Parts 240 and 241.[49]

Regional Incineration

The Northeast has a large portion of the incinerator infrastructure in the United States. This is partially due to the limited space available for landfills as well as the region's high population. In New York and adjacent states, including Connecticut, New Jersey, and Pennsylvania, there are 35 incineration facilities, as listed in **Table 12.** These incinerators can process 43.6 thousand tons per day or over 13 million tons per year (assuming 307 operational days).

Table 12. Regional Incinerator Facilities

Facility Name	State	Capacity (TPD)
Reworld Bristol Energy	CT	650
Reworld Southeastern Connecticut Company (SECONN)	CT	669
Wheelabrator Bridgeport	CT	2,250
Wheelabrator Lisbon	CT	500
Ecomaine	ME	550
Mid-Maine Waste Action Corporation (MMWAC) Resource Recovery Facility	ME	200
Eagle Point Energy Center	ME	720
Montgomery County Resource Recovery	MD	1,800
Wheelabrator Baltimore Waste	MD	2,250
Reworld Haverhill	MA	1,650
Pittsfield Resource Recovery Facility	MA	240
SEMASS Resource Recovery	MA	2,700
Wheelabrator Millbury Facility	MA	1,500
Wheelabrator North Andover	MA	1,500
Wheelabrator Saugus	MA	1,500
Wheelabrator Concord Facility	NH	500
Camden Resource Recovery Facility	NJ	1,050
Reworld Essex County	NJ	2,277
Union County Resource Recovery	NJ	1,440
Wheelabrator Gloucester LP	NJ	500
Reworld Huntington	NY	750
Dutchess County Resource Recovery Facility	NY	450
MacArthur Waste to Energy Facility	NY	486
Onondaga County Resource Recovery	NY	990
Oswego County Energy Recovery	NY	200
Wheelabrator Hudson Falls	NY	500
Reworld Babylon Inc	NY	750

Table 12. Regional Incinerator Facilities

Facility Name	State	Capacity (TPD)
Reworld Hempstead	NY	2,505
Reworld Niagara	NY	2,250
Wheelabrator Westchester	NY	2,250
Reworld Plymouth Renewable Energy	PA	1,216
Reworld Delaware Valley	PA	3,500
Lancaster County Resource Recovery	PA	1,200
Susquehanna Resource Management Complex	PA	800
York County Resource Recovery	PA	1,344
Reworld Bristol Energy	CT	650
Reworld Southeastern Connecticut Company (SECONN)	CT	669
Wheelabrator Bridgeport	CT	2,250
Source: Global WTERT Council's 2018 Directory of Waste-to-Energy Facilities[50]		

In the Northeast, there are no outright bans on incinerator development, However, Delaware effectively prohibits the development of incinerators through siting and zoning laws while Rhode Island statuary policy and laws identify the health and environmental impacts and cost burden of incinerator development as too high. Rhode Island also prohibits the statewide resource recovery system development plan from including solid waste incineration.[51]

Between 2000 and 2018, the number of incinerators in the United States decreased from 97 to 75, indicating the decline in use of incineration as a waste disposition option.[52] Based on available information, there are no anticipated incinerators in development, and therefore no increases in the anticipated capacity of incinerator facilities. Additionally, like the landfill disposal system, some incinerators have limitations on incoming waste, such as only accepting materials that are generated in-county or by members of an organization formed to support the deployment of incinerator infrastructure.

New York City Incineration

New York City housed the first incinerator in the United States, which was built in 1885 on Governor's Island. From 1918 and 1938, the Department of Sanitation built 14 incinerators in New York City, and many apartment buildings had private incinerators used to burn residential waste. Incineration of waste in private incinerators was prohibited in New York City, pursuant to Local Law 39 of 1989 (the law does not affect medical waste incinerators and crematoriums).[53] The last municipal incinerator closed in 1990 and was dismantled in 1993. By 1994, all municipal and private incinerators ceased operations. However, DSNY continues to export MSW for disposal at regional incinerators. Commercial waste generated in New York City may also be exported for incineration.[54,55]

In New York, combustion and thermal treatment facilities must be registered with or permitted by the State unless exempted from that requirement as outlined below.[56]

- Exempt facilities may include hospitals, residential health care facilities, or other medical facilities; animal crematories; facilities that combust traditional fuel or alternative fuel that is not stored on-site; and facilities or activities that combust solid wastes that authorized under 6 NYCRR Section 215.3 (e.g., on-site burning of agricultural waste).
- Registered facilities may combust or thermally treat 10 or fewer tons per day of waste tires; 1,000 or fewer gallons per day of used cooking oil or yellow grease; or an alternate fuel authorized by DEC.

When facilities don't meet the designations for registered or exempt facilities, they must apply for a permit.

Incineration Analysis

In New York City, approximately one-third of waste managed by DSNY is disposed of through incineration, with the remaining two-thirds sent to landfills. In 2023, DSNY-managed waste was incinerated at one of three Reworld facilities: Chester (PA), Niagara (NY), and Essex (NJ), as shown in **Table 13**.

Table 13. Incineration Facilities Used by DSNY in 2023

Incinerator	State	DSNY Waste Disposal (ATPD)	Incinerator Capacity (TPD)	DSNY Waste Disposal (TPY)*	Incinerator Capacity (TPY)	Percent of Annual Capacity Used for DSNY Waste
Reworld (Essex)	NJ	1,229	2,277	368,700	985,500	37%
Reworld (Chester/ Delaware Valley)	PA	813	3,500	243,900	1,074,500	23%
Reworld (Niagara)	NY	1,275	2,250	382,500	821,250	47%
TOTAL		**3,317**	**8,027**	**995,100**	**2,881,250**	35%

DSNY: New York City Department of Sanitation; ATPD: average tons per day; TPD: tons per day; TYP: tons per year.
*To convert between daily and annual capacities, 307 days of operation were assumed for the incineration facilities.
Source: NYC OpenData: DSNY Disposal Sites Used by Facilities by Year

The incinerator facilities used to process DSNY-managed waste in 2023 have a combined total daily capacity of approximately 8,000 tons. The total capacity of these incinerators is estimated at 2.9 million tons per year. In 2023, DSNY vendors used approximately 1 million tons of capacity at these facilities.

The quantity of waste generated and the incinerators used has changed due to a variety of factors, including shifts in population, policy, contracts, capacity, and transportation. Between 2015 and 2023, eight incinerators were used to dispose of DSNY-managed waste.

Recycling Facilities

Recycling covers a wide array of operations that may include one or multiple of the following activities: collection, baling, sorting, containerizing, crushing, or other recycling processes. The type of activities performed at a facility depends on the types of materials that are accepted, space available at the facility, technologies being used, and other logistics.

Recycling facilities range from small-scale enterprises that process a single material to larger facilities handling multiple materials. Recycling facilities may be referred to as material recovery facilities (MRFs), which typically recycle glass, metal, or paper; recyclables handling and recovery facilities (RHRFs); or recycling processors (e.g., scrap metal recyclers). RHRF is the term that DEC uses to describe facilities that handle source-separated recyclables. DSNY and DEC datasets also identify facilities as recycling processors and scrap metal processors. Recycling facilities in New York State require registration or a permit unless they meet exemption requirements as described below:[57]

- DEC **registered** recycling facilities may not generate more than 15% of non-recyclable material based on their annual intake. Registered facilities are also required to have a vehicle scale or alternate means of weighing incoming and outgoing materials if they receive more than five tons of materials per day.
- DEC **exempt** recycling facilities include take-back sites, where retailers or wholesalers collect recyclable materials that are similar to the items they sell, to be reused or recycled; sites operated by governments or nonprofits that accept consumer goods for reuse or secondary marketing; and municipal facilities receiving less than 20 cubic yards of recyclables per day.
- DEC **permitted** recycling facilities do not meet the criteria for registered or exempt facilities (outlined in CRR Subpart 361-1).

There were 19 active recycling facilities in New York City in 2022. In 2020, forty-two active scrap metal processors reported data to DSNY in 2020.[a] In 2023, 12 scrap metal processors in New York City reported tonnage processed to DEC. Additional recycling and scrap metal facilities are permitted or registered with DEC but have not received material in 2023.[58]

Recycling facilities in New York City are listed in **Table 14**. Most of the facilities on this list are used by commercial haulers. All recycling facilities in the city are privately owned, except the 59th Street MTS for paper recycling, which is owned by the City.

Recycling processes may be performed manually or by machinery. In New York City, many recycling facilities are smaller scale due to zoning restrictions and space limitations. Many of the facilities are old and have not been modernized to take advantage of available technology and machinery. For these reasons, most recycling facilities within New York City perform a subset of recycling functions, and their operators often collaborate with neighboring recycling facility operators to separate and process recyclable materials. Data on the processing capacity of New York City's recycling facilities is generally unavailable.

[a] 2020 is the most recent year for which scrap metal processor reports to DSNY are available.

Table 14. Recycling Facilities in New York City, 2022

Facility Name	Material	County
Action Environmental Services	Organics, Recyclables (unspecified)*	Bronx
Paper Fibres Corp	Paper, plastic	Bronx
Parallel Products of New England, Inc	MGP	Bronx
Royal Recycling Services	Organics, Recyclables (unspecified)	Bronx
SIMS Metal Management	Metal	Bronx
Waste Connections of NY	Organics, MGP, Paper	Bronx
Allocco Recycling	Scrap metal, fill	Kings
Allocco Recycling	Paper, scrap metal	Kings
Brooklyn Resource Recovery, Inc.	Scrap metal	Kings
Emerson Recycling	Recyclables (unspecified)	Kings
Fortune Metal Inc	Recyclables (unspecified)	Kings
Fortune Metal Inc	Recyclables (unspecified)	Kings
Greenpoint Scrap Metal	Recyclables (unspecified)	Kings
Hi Tech Holdings LLC	Wood waste, metal, light construction, furniture & appliances, organics	Kings
Metropolitan Paper Recycling	Organics, MGP	Kings
Parallel Products of New England, Inc	MGP	Kings
Rapid Processing Brooklyn	Recyclables (unspecified)	Kings
SIMS Municipal Recycling	MGC, Paper	Kings
USA Recycling Inc	Recyclables (unspecified)	Kings
A&R Lobosco Recycling	Recyclables (unspecified)	Queens
Boro-Wide Recycling	C&D, MGP, Paper, Electronics	Queens
Commercial Recycling Technology Inc	Recyclables (unspecified)	Queens
EWG Glass Recovery & Recycling (158th Street)	Glass	Queens
EWG Glass Recovery & Recycling (180th Street)	Glass	Queens
GPB Waste NY (Rapid Recycling Processing NY)	Paper, MGP	Queens
Royal Waste Services Inc	Organics, Recyclables (unspecified)	Queens
Royal Waste Services Inc	Recyclables (unspecified)	Queens
SIMS Metal Management	MGP, Paper	Queens
Donjon Recycling	Scrap Metal	Richmond
John Francesco Scrap Inc	Scrap Metal	Richmond
Pratt Industries	Paper	Richmond

Notes: MGP – metals, glass, and plastics
*The word "(unspecified)" indicates the facility may accept multiple types of recyclables (e.g. paper, plastic, metal, glass or some combination thereof).
Source: Recycling facility reports to DSNY; DEC Registered and Permitted Recycling and Handling Facilities Reports

New York City Recycling Capacity

DSNY has contracts with SIMS Municipal Recycling for metal, glass, and plastic (MGP), paper, and bulk metal, and contracts with Pratt for paper and cardboard. DSNY owns the 59th Street MTS, which is used to transfer paper and cardboard to the Pratt recycling facility by barge. The typical throughput capacity for the DSNY 59th Street MTS is 4,800 tons per day. Some of the paper collected by DSNY is transferred to Pratt via SIMS. In 2023, DSNY collected over 285,000 tons of MGP and nearly 300,000 tons of paper and cardboard for recycling. In addition, DSNY managed around 2,500 tons of bulk metal from its operations.[2] **Table 15** indicates the quantity of DSNY-collected recycling moving through various facilities in New York City.

Table 15. Tons and Destinations of DSNY-Managed Recycling, 2023

Material	Contractor Name	Location	County	2023 DSNY Tons Received (TPY)
MGPC	SIMS Municipal Recycling	30-27 Greenpoint Ave	Queens	82,814
	SIMS Municipal Recycling	850 Edgewater Rd	Bronx	86,553
	SIMS Municipal Recycling	Claremont Terminal	Hudson, NJ	48,850
	SIMS Municipal Recycling	472 2nd Avenue	Kings	67,535
	Total MGPC			**285,752**
Paper	SIMS Municipal Recycling	30-27 Greenpoint Ave	Queens	73,710
	SIMS Municipal Recycling	850 Edgewater Rd	Bronx	59,013
	SIMS Municipal Recycling	472 2nd Avenue	Kings	32,938
	Pratt	4435 Victory Blvd	Richmond	63,248
	Pratt (from 59th St. Transfer Station)	W 59th St & West Side	New York	68,526
	Total Paper			**297,436**

Notes: TPY – tons per year; MGPC – metals, glass plastics, and cartons
Source: 2023 Recycling Data from DSNY

While the exact processing capacity is unavailable for recycling facilities, the Pratt paper recycling facility in Staten Island processes approximately 450,000 tons a year and operates at near capacity. The design capacity of Sims Municipal Recycling in Brooklyn is 24,800 net tons of MGP, 7,800 net tons of paper, and 10,000 net tons of scrap metal per month. Annually, this totals approximately 500,000 tons of material. DSNY currently uses approximately 85% of this MGP capacity. SIMS facilities in the Bronx, Queens, and in New Jersey are also used to receive DSNY-collected recyclables. Data on the capacity of those facilities is not available.

As New York City anticipates increased diversion rates, additional recycling capacity should be explored. Facilities outside of New York City and New York State can accept recyclables from DSNY and the private sector. In 2025, Interstate Waste Services opened a 45,000-square foot recycling facility in North Arlington, New Jersey. The company has been awarded contracts in 14 commercial waste zones and opened the facility to process an anticipated influx of material.[59]

Types of Recycling Facilities

Multiple steps are required to turn recyclable materials into new products or reusable raw materials.[60] For instance, when paper is recycled, it may undergoe three steps: 1) decontamination, 2) sorting paper by type (i.e. glossy paper, corrugated cardboard, and mixed paper), and 3) baling the sorted paper. In the next stage, the baled paper is

shredded and converting into pulp by mixing the shredded paper with water, hydrogen peroxide, and other chemicals. Then the paper undergoes a process to remove ink before it is dried for distribution to a paper mill. The paper mill prepares the dried pulp, adding chemicals before rolling the pulp into new paper products. Pulp and paper mills are often combined or co-located to increases efficiency. In New York City, Pratt is an example of a combined pulp and paper mill; however, it is unique in that it processes commingled (mixed) paper and does not sort by paper type prior to pulping.[61]

In New York City, the primary function of most recycling facilities is to sort materials into commodity categories which are then consolidated for export to further processing outside of the city.

The specific types of recycling facilities, their processes and technologies, and the potential end markets for their recycled materials are described in **Table 16** below.

Table 16. Major Recycled Material Processing Descriptions and End Markets

Material	Processing Facility	Description	Potential End Markets
Glass	Glass processor/ Material Recovery Facility (MRF)	Glass is collected, crushed, sorted, and cleaned for primary and secondary end markets. Depending on the end market use, glass will be sorted by size and color.	Flat glass manufacturer Blown glass/glassware manufacturer Glass container manufacturer Specialty glass (e.g. pozzolan)
Metal	MRF Scrap metal processor	Metals are sorted, crushed, compacted, and cut. This product may be sent to end markets. Alternatively, once metal is cut, it may be shredded, melted, purified, and solidified into desired form for end markets.	Foundries Rolling and alloying facilities Iron and steel mills Metal manufacturing, including jewelry, cutlery, hardware, electroplating, and more
Paper	MRF	Post-consumer paper is collected, sorted, and baled for end markets.	Pulp mills Paper, newsprint and paperboard mills
Plastics	MRF	Plastic is collected, sorted by type and processed into pellets, chips, or flakes for end market use.	Carpet and rug mills Synthetic rubber manufacturing Polystyrene foam Plastic bottle manufacturing Packaging and label services Plastic fixtures and furniture
Textiles	Textile recycler	Textiles are collected and shredded. The scrap and fiber produced are distributed to end markets.	Fiber, yarn, and thread mills Woven and knit fabric mills Textile and fabric finishing mills Carpet and rug mills Apparel and furniture manufacturers
Wood	Wood recycler	Wood is collected and sorted by type and reuse potential, then processed accordingly into chips, pellets, pulp, or other forms for end markets.	Hardwood veneer and plywood manufacturing Pulp mills Paper mills

Table 16. Major Recycled Material Processing Descriptions and End Markets

Material	Processing Facility	Description	Potential End Markets
			Construction material manufacturing Furniture and durable goods manufacturing
Rubber	Rubber recycler and waste tire processor	Rubber is collected and shredded into smaller pieces for end markets.	Asphalt manufacturing Rubber and plastics manufacturing
Sources: Recycling Infrastructure and Market Opportunities Map: Technical Methodology, EPA, 2023 [60]; GLE Scrap Metal[62]; Rubicon Technologies[61]			

Source-Separated and Single-Stream Recycling

Source-separated recycling is the practice of separating designated metal, glass, plastic, and beverage cartons from paper and cardboard. This allows for more efficient processing at recycling facilities.[63] In New York City, curbside residential recycling is required to be pre-sorted into two categories: 1) mixed paper and 2) metal, plastic, glass, and cartons. Commercial entities may also participate in source separated recycling depending on the requirements of their waste hauling vendor.[64]

Single-stream recycling is defined by NYCRR § 1-01 as a system in which designated recyclable metal, glass and plastic and designated recyclable paper are placed in the same bags or bins by the waste generator. These bags and/or the contents of the designated bins are placed into one waste hauling truck, separate from refuse and organic waste, and are delivered directly to a recycling processing facility. Single-stream recycling processing facilities must be designed to receive, separate, and process commingled loads of designated recyclable metal, glass, plastic, and paper for reuse or sale.[65] Single-stream recycling increases collection rates of recycling; however, it simultaneously increases contamination rates and impacts processing efficiency of recycling facilities.[66]

DSNY does not accept single-stream recycling for curbside collections.[64] Private waste haulers and recycling facilities may collect and process single-stream recycling.[63] There are 48 waste haulers licensed by the Business Integrity Commission (BIC) to collect single-stream recycling from commercial entities.[67] With the implementation of the Commercial Waste Zones program, the number and type of private waste haulers may change.[68]

In New York City, eight privately owned recycling facilities accept and sort single-stream recycling, based on 2023 Annual Reports to DEC and information published online by the companies that own the facilities.69,70 These facilities are listed in **Table 17**. Seven of the eight facilities are registered or permitted as RHRFs with DEC. The Action Environmental/IWS Bronx facility is documented by DSNY and the DEC as a permitted putrescible transfer station, but accepts, sorts, and bales single stream recycling.

Table 17. New York City Single Stream Recycling Facilities

Facility Name	Location Address	County	Activity Description	DEC Activity Number
Royal Waste Services Inc.	187-40 Hollis Ave	Queens	RHRF - registration	[41M85]
Royal Recycling Services	187-10 Jamaica Ave	Queens	RHRF - registration	[41MA8]
Parallel Products of New England 138th St.	900 East 138th St	Bronx	RHRF - permit	[03M42]
Parallel Products of New England 136th St.	900 East 136th St	Bronx	RHRF - permit	[03MG2]
Action Environmental Systems/Interstate Waste Services Bronx	920 East 132 St	Bronx	Transfer station - permit	[03T32]
Royal Waste Services Inc.	891 East 135th Street	Bronx	RHRF - registration	[03R20012]
Hi Tech Holdings LLC d/b/a Scholes Street Recycling	492 Scholes St	Kings	RHRF - registration	[24MF9]
Boro Wide / Empire State Cardboard Paper Recycling	3 Railroad Place	Queens	RHRF - registration	[41MA2]
Sources: New York State Open Data Solid Waste Management Facilities; DEC RHRF Annual Reports 2023				

Additionally, the following DEC-registered RHRFs accepted some single-stream commercial materials for recycling from 2016-2023, as reported in recycling processor and scrap metal processor commercial datasets. However, information regarding the sorting and processing of the material on-site is not reported:[70]

- Commercial Recycling Technology, LLC, 57-01 Flushing Avenue, Queens
- US Recycling, Inc., 141 6th Street, Brooklyn
- Emerson Recycling Corp., 63-65 Emerson Place, Brooklyn
- Metropolitan Paper Recycling, Inc., 854 Shepherd Avenue, Brooklyn

To identify New York State recycling facilities that process single-stream recycling outside of New York City and may have capacity to accept New York City's single-stream recyclables, data was obtained from the New York State Open Data list of active solid waste management facilities. Recycling facilities were filtered to include registered facilities that may accept five tons per day or more and listed "single stream" under "waste types." Thirteen facilities fit these criteria as of 2025. Based on Open Data, 2023 Annual Reports to DEC, and recycling company data, the facilities listed in **Table 18** are active, registered to accept over five tons per day, sorted single-stream recycling on-site in 2023, and are privately owned, making them a potential option for processing single-stream recycling from New York City.[70]

Table 18. New York State Single Stream Recycling Facilities

Facility Name	County	DEC Region	DEC Activity Number
Dependable Disposal	Onondaga	7	[34R20018]
Broome Recycling Co. Inc.	Broome	7	[04R20012]
Batavia Transfer Station	Genesee	8	[19M10015]
Southern Tier Recycling Center	Cattaraugus	9	[05R20022]
Notes: MRF – material recovery facility Region 2 is New York City. Regions 4-9 are in Upstate New York. **Sources:** New York State Open Data Solid Waste Management Facilities; DEC RHRF Annual Reports 2023			

Organics Processing and Capacity

Organic waste includes food scraps, plant matter, food-soiled paper, biosolids, and certified compostable products. In New York City, organics processing may involve anaerobic digestion, mulching, or composting. Compost and mulch support healthier plant life and may be used as fertilizer for gardens and agricultural spaces. Biogas produced from anaerobic digestion can be beneficially used to provide energy. Facilities processing organics may be owned or operated by, or contracted by or on behalf of, a municipality. Facilities may also be privately owned and operated.[71]

Organic waste may require preprocessing, depending on the manner in which the material is collected, handled, and processed. Pre-processing of organics may be accomplished mechanically or manually. Tiger and Thor preprocessors are two examples of decontamination machines used for DSNY-managed organic waste. If the organic material processed is intended for compost or mulch, decontamination is the only preprocessing required. If the organic material is intended for anaerobic digestion, the material is converted into a bioslurry during the pre-processing phase. Waste Management operates a CORe™ preprocessor at its Varick Avenue Transfer Station in Brooklyn to decontaminate and preprocess organic waste into a bioslurry. The bioslurry is then transferred to

anaerobic digestors at the New York City DEP's Newtown Creek Wastewater Resource Recovery Facility (WRRF), where it is co-digested with biosolids and biogas is harvested.[71,72]

DSNY-Managed Organics Collection

In 2024, DSNY expanded New York City's curbside organics collection to include residences and public schools in all five boroughs. In 2023, around 38,000 tons of source-separated organic waste were collected by DSNY's residential curbside and school collection programs.[73]

DSNY owns the Staten Island Compost Facility (SICF), Rikers Island Compost Facility, and Soundview Park Compost Facility and contracts Denali Water Solutions (Denali) to operate the facilities. 34,000 tons of organics were processed at these locations in 2023 (including private landscaper materials received at SICF). The Rikers Island Compost Facility composts food scraps from the Department of Corrections operations on the island. Soundview Park processes leaves, yard waste, and wood debris, largely collected from New York City residents. The Staten Island Compost Facility receives material from private landscapers and accepts horse manure from the New York City Police Department (NYPD), as well as some residential and school organics collected by DSNY.

Additional organic waste is collected through community compost facilities and community organizations such as Green Markets. The NYC Compost Project (NYCCP) operated as a multi-site educational composting program for New York City residents managed by DSNY and operated by nonprofit organizations.[74] New York City continues to support community composting and strategies proposed as part of *SWMP26* discuss this support.

DSNY-Managed Organics Transfer and Processing Sites

Table 19 lists the seven New York City facilities or sites involved with processing and pre-processing of DSNY-managed organics in 2023. Waste Management of New York's (Varick Ave) and American Recycling are pre-processing and transfer facilities, and the remaining facilities process material onsite. The Staten Island Compost Facility (SICF) provides pre-processing and processing for organic waste. DSNY also activated contracts for the transfer of DSNY-managed organics at the Waste Management Elizabeth, NJ CORe facility and transfer station and Denali's Metropolitan transfer station in 2024.[71]

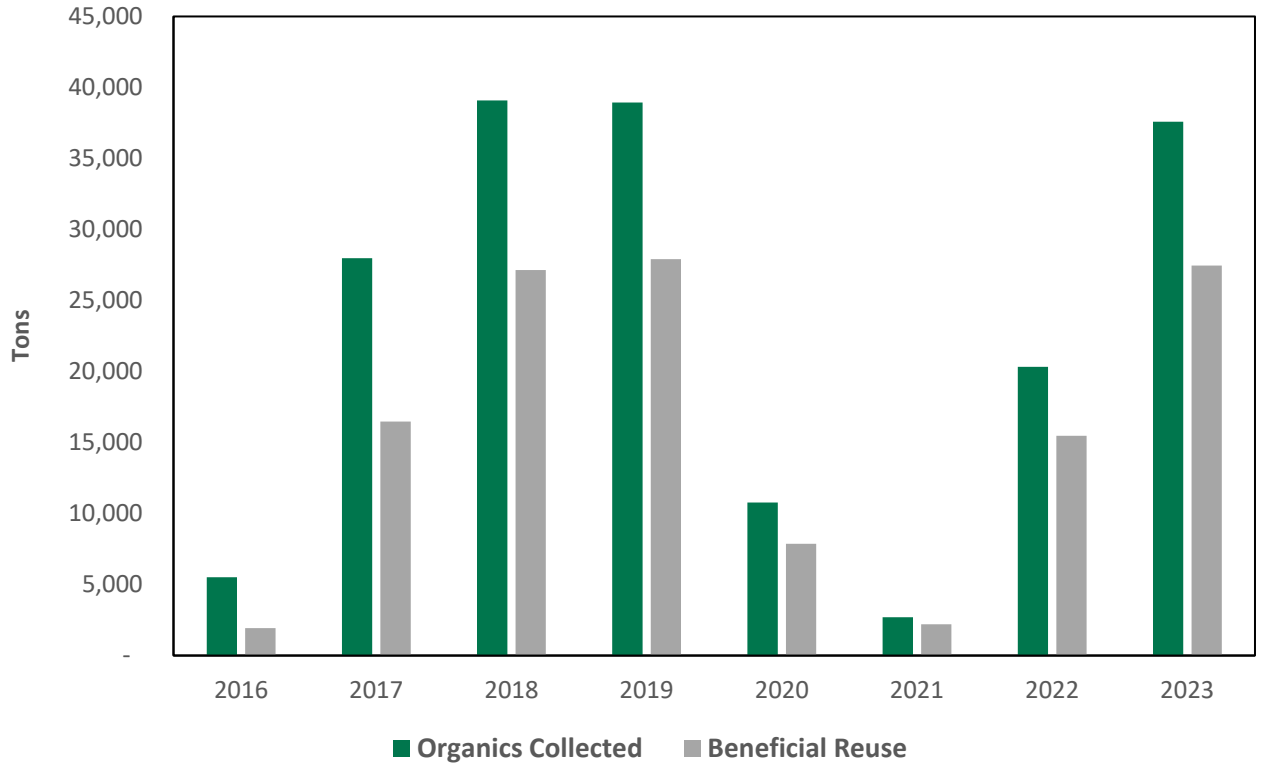
Table 19. DSNY-Managed Organics Program, New York City Facilities and Contracts

Facility Name	Destination	Mechanism	SSO Capacity (TPD)	Other Capacity	Recovery Rate
DSNY-Parks Soundview Park	NYC Metro Area	Windrow composting and mulching	0	3,780 TPY (Yard trimmings and leaves)	NA
Waste Management of NY – Varick Avenue	Newtown Creek WRRF and Compost/Mulch in NJ/PA	CORe Pre-processing	300		85%
American Recycling	Pine Island Farm AD and Compost/Mulch on Long Island	Thor Pre-processing	150	570 TPD total capacity (150 set aside for organics)	55%
DSNY's Staten Island Compost Facility	NYC Metro Area	Compost windrow and mulch processing facility		105,000 CY/year of yard trimmings and tree debris	NA
				70,000 CY/year of tree debris	
		Tiger depack pre-processing; composting facility	NA	Up to 30 TPW of SSO	
		Micro-membrane covered aerated static pile composting system*	100	Up to 600 TPW of SSO	
NYC DEP Newtown Creek WRRF	Renewable biogas production; landfill cover (biosolids)	Anaerobic Digester	250		75%
Rikers Island Compost Facility	Rikers Island	BDP Windrow system	-		NA
Cunningham Park Mulch Pile	Chipped for reuse	-	-	Follows DEC mulch facility sizing guidelines	NA

Notes: TPD – tons per day; TPW – tons per week; CY – cubic yards; WRRF – wastewater resource recovery facility; SICF – Staten Island Compost Facility
*SICF can process ten tons per day with the Tiger depack pre-processor and up to 150 TPD in the aerated static pile system but have maximum weekly capacities of 30 and 600 tons per week for SSO acceptance. SICF's overall capacity for SSOs is 600 TPW, which was divided by 6 operating days a week to calculate average daily capacity.
Organics capacity for the American Recycling facility is a portion of the putrescible permit capacity listed in LL152.
Source: 2022 DSNY Data- Organics Processing and Pre-Processing Contracts and Outlets Data; 2024 DSNY Contract List

Figure 8 shows the annual tonnage of source-separated organic material collected by DSNY and processed for beneficial use. As the City's organics collection programs expand, additional processing capacity will be needed. In 2024, DSNY installed an aerated static pile system at SICF, which expanded SICF capacity by around 30,000 tons per year.[75]

Figure 8. Beneficial Use of Organics Capacity vs. Throughput



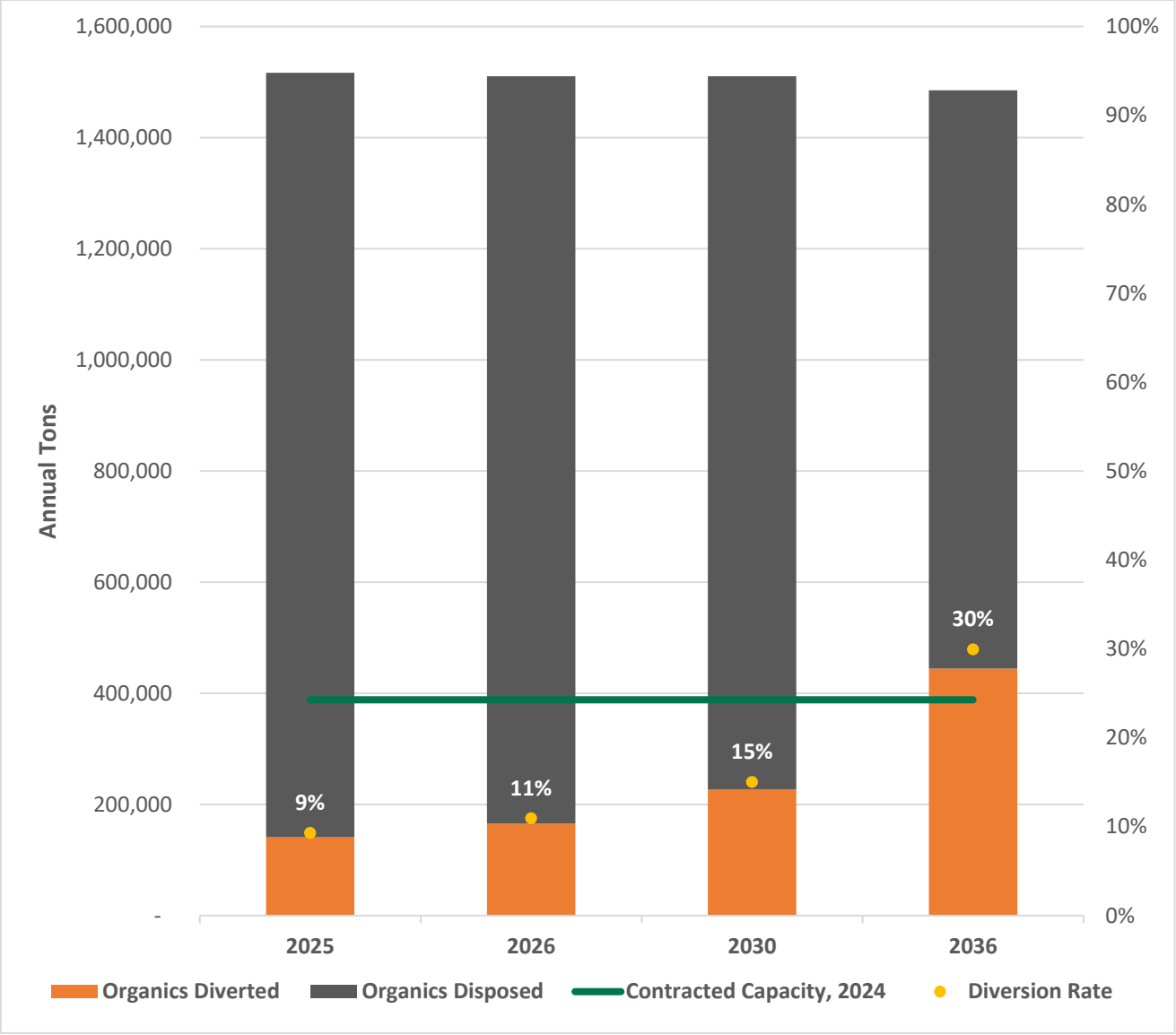
Anticipated Organics Capacity and Use

Although organics collection has increased, only around 5% of DSNY-managed waste (including private landscaper leaf and yard waste accepted at DSNY compost sites) was diverted for organics recycling in 2023. The 2023 Waste Characterization Study[76] found that organics compose over one-third of New York City's residential waste stream. The Citywide Organics Program rolled out began in 2023 and was expanded to all boroughs in 202. 2025 was the first full year that the program was available to all boroughs. An estimated 140,000 tons of organic waste were managed by DSNY in 2025, reflecting a capture rate of around 9%. Around 110,000 tons of source-separated organics were collected from residents and schools as part of the Citywide Organics Program, and an additional 30,000 tons of organics were composted at DSNY-managed sites.

The amount of organic waste generated annually in New York City is projected to decrease by 25,000 tons from 2026 to 2036, despite projected population growth, due to waste diversion and reduction efforts. However, the annual tonnage of organics managed by DSNY is projected to increase from 165,000 to over 440,000. As shown in **Figure 9**, the capture rate for organics is projected to reach 15% by 2030 and nearly 30% by 2036. The current contracted

capacity for DSNY organic curbside collections only allows for a 25% recovery rate based on 2025 tonnage. Capacity must increase by approximately 60,000 tons per year to manage the projected quantities of organics in 2036. This does not account for capacity used for privately managed organics, or for operational limitations. DSNY must secure additional organics processing and transfer capacity to accommodate higher organics capture rates in the future.

Figure 9. DSNY-Managed Organics Diversion Potential



Other New York City Facilities

In addition to the large-scale organics processing facilities that manage DSNY-collected waste, New York City also has local organics processing facilities. These include DSNY-funded and community-based organics processing facilities, primarily composed of composting or mulching initiatives. The DSNY-funded New York City Compost Project (NYCCP) included seven sites that supported community-based composting education: Big Reuse

(Queensbridge Site and Gowanus Salt Lot), Brooklyn Botanical Garden (at Red Hook Farms and Columbia Street Farm[b]), New York Botanical Garden, Earth Matter NY (Compost Learning Center, Governors Island), Lower East Side (LES) Ecology Center (East River Compost Yard, temporarily relocated), Queens Botanical Garden (QBG Farm and Compost), and the Snug Harbor Cultural Center and Botanical Garden. The East River Compost Yard closed in October 2021, and the Big Reuse Queensbridge site closed in June 2024. The Big Reuse Gowanus Salt Lot closed in February 2024 with plans of reopening. NYCCP was defunded in late 2023 but supplemented by donations. Funding was restored through fiscal year 2026.

These sites do not accept curbside collected organics; however, NYCCP sites may accept food scrap drop-offs (FSDOs) funded by DSNY, such as material collected through NYC Green Markets.[74] The exact capacity of NYCCP sites is challenging to estimate. In 2024, NYCCP sites processed 241 tons of organics.

Additional compost sites in New York City include Hudson River Park, which reported receiving 252.5 tons of organic material in 2021, and the Battery Park City Authority, which composted over 35,000 pounds (17.5 tons) of organics in 2019.[77]

Regional Organics Recycling Facilities

To better support New York City's organics diversion, DSNY conducts informal surveys to analyze the capacity of regional organics processing facilities and beneficial use sites. Sites contacted include those in New Jersey, Connecticut, Pennsylvania, and New York. Surveys conducted in 2022 indicate that there is much more capacity for the beneficial use of organics at regional facilities outside of New York City, including 218,000 tons per year of potentially uncommitted capacity for food waste and 59,000 tons per year of additional near-term food waste capacity.[78]

In 2023, Waste Management Varick sent the majority of recovered organics to Newtown Creek WRRF and a small amount to Nature's Choice Corporation & Reliable Wood Products, LLC in New Jersey. From 2019-2022, American Recycling sent all recovered organics to Pine Island Farm in Sheffield, Massachusetts. In 2023, American Recycling sent material to Pine Island Farm, American Materials Recovery, and RER Supply. That year, American Recycling secured new agreements with American Materials Recovery, LLC; RER Supply; and Long Island Compost Corp. (Great Gardens, LLC/American Organic Energy, LLC) for the beneficial reuse of organics. American Materials Recovery may receive up to approximately 5,800 tons per year of compostable organics and leaf/yard waste at their Cutchogue, New York location. RER Supply may accept up to 3,000 tons of yard waste per day at its Riverdale, New Jersey location, and up to 1,560 tons of yard waste per day at its Wantage, New Jersey location. The Long Island Compost Corp. Yaphank, New York location is permitted by the State to accept approximately 1.3 million tons of various organic materials per year. It is unclear how much of the permitted capacity at these facilities may be used for material from DSNY material delivered by American Recycling; however, they do represent significant available capacity, particularly for leaf and yard waste, as DSNY's organics collection program grows.

DEC Requirements for Organics Facilities

Organics facilities that accept between 3,000 cubic yards and 10,000 cubic yards of yard trimmings per year, or less than 5,000 cubic yards or 2,500 wet tons of source-separated organics, are required to register with DEC. Other facilities that are required to register include sites that accept road-killed animals or routine animal mortalities and facilities for digestate.[79] Facilities that accept more organic material than registered facilities require permits.

[b] This composting location is shifting to providing composting education only.

Facilities that accept an average 1,000 pounds of SSO per week, and facilities that accept no more than 3,000 cubic yards of yard trimmings per year, are exempt from permitting and registration.[79] Exempt facilities may also include composting facilities located on farms for animal carcasses if the farm is not a concentrated animal feeding operation, State agency, or municipal entity. For this reason, community-based composting generally does not require permitting. The New York Botanical Garden is an example of an exception, as it does not accept food scrap drop-offs (FSDO) and only processes organics generated on-site.[79]

Commercial Organics Capacity

Commercial organics refers to organic waste generated and managed by the private sector, including organic waste discarded by restaurants and other businesses. With the introduction of Local Law 146 of 2013 (LL146), certain New York City establishments are required to separate organic waste for beneficial reuse. LL146 allows establishments to outsource organics processing or process organics on-site with certain restrictions. Since it was first published, the set of establishments that are impacted by LL146 has expanded.[80] Additional information on LL146 and impacted entities is available in **Attachment A: Local Laws Relevant to Waste Management**, and **Attachment G: New York City Commercial Recycling Rules**.

In 2023, over 70,000 tons of commercial organic waste were received in New York City transfer stations. Approximately 28,000 tons of commercial organic waste were received at the Regal Recycling transfer station in Queens, and approximately 40,000 tons of commercial organic waste were received at the Wast Management Varick Avenue transfer station. Brooklyn Transfer and Hi-Tech Resource Recovery transfer stations received smaller quantities of commercial organics.[58] This does not include the quantity of commercial organic waste transported directly out of New York City or the quantity of commercial organic waste processed on-site.

Approximately ten percent of New York City's commercial organics were separated for recycling in 2023. The diversion rate is expected to increase to 40% by 2036, to nearly 300,000 tons per year. Three of the four transfer stations that accepted commercial organics in 2023 reserve capacity for source separated organics. This is a total of 332 tons per day (over 100,000 tons per year).[5] In 2023, only around 30% of this capacity was used, leaving 70,000 annual tons of capacity at the Brooklyn Transfer, Hi-Tech Resource Recovery, and Regal Recycling transfer stations. Additionally, the Varick Avenue transfer station had around 900,000 tons of remaining permitted capacity for putrescible waste in 2023. Between these four transfer stations, there is sufficient capacity for the projected commercial organics tonnage.

Biosolids Capacity

New York's 14 WRRFs treat wastewater. Six of these facilities dewater the digestate to produce biosolids.[81] Biosolid production correlates with population and depends on the treatment technology and process efficiency. New York City produced over 510,000 wet tons of biosolids in 2019 and around 475,000 tons in 2024. Biosolids from wastewater treatment may be used beneficially in agriculture, as compost, for alkaline stabilization in mining and agriculture, or thermal drying. Biosolids produced in New York City are contracted through third-party contracts. In fiscal year 2023, the majority (58%) of New York City's biosolids were used or disposed of in Pennsylvania. Around 20% of biosolids were disposed of in Ohio, 14% in New Jersey, and 7% in New York.[82]

The City's biosolids management contracts, throughput, and capacity are listed in **Table 20**. The total daily tonnage capacity included in the contracts is 1,935 wet tons, nearly 600,000 tons per year. This is sufficient for the 540,000 tons managed in 2023. DEP projects biosolids tonnage to reach 588,500 tons by 2036. A contracted capacity of

600,000 tons is sufficient, but some contracts will expire during the planning period; new contracts or contract renewals must be established.

Biosolids are transported to disposition sites via truck or rail. In 2019, over 75% of New York City's wastewater biosolids were sent to landfill or used as landfill cover. In 2023, 55% of biosolids were sent to landfills with the remainder applied directly to land or further processed for other beneficial reuse. DEP aims to divert 100% of biosolids from landfills by 2030, if feasible.[83]

Table 20. Biosolids Contract Capacity and Throughput

Biosolids Management Contract Number	Number of Dewatering Location Serviced	Maximum Allowable Daily Tonnage As Per Contract (Wet Tons/Day)	Daily Tonnage Received from WRRFs (Average Range of Wet Tons/Day)	Contract End Date	Beneficial Use
1515-BIO	1	160	30	7/31/2027	Required
1534-BIO (1,2,3)	6	925	200-325	9/6/2025	Optional
1564-BIO	2	350	200-225	9/30/2031	Required
1566-BIO	2	350	250-350	11/30/2026	Required
1567-BIO	3	150	150-175	7/16/2032	Required
Notes: TPD – tons per day; DEP – Department of Environmental Protection **Source:** Data provided by New York City DEP.					

Section 2. Export of DSNY Solid Waste

As previously described, the 2001 closure of the Fresh Kills Landfill and the City's ban on incinerators resulted in a shift to long-distance transportation to dispose of the city's waste via truck, rail, and barge in the early 2000s.[8]

Table 21 outlines the benefits and impacts of each transportation methods used for waste-hauling. Trucks are not ideal for long-distance hauling due to several factors including inefficiency, noise pollution, tailpipe emissions, and impact on traffic, all of which impact the quality of life for residents. Notably, air pollutants and GHGs from truck emissions are a public health and environmental concern.

To address this issue, DSNY developed the Marine Transfer Station (MTS) program, resulting in a larger proportion of waste exported from the city by barge and rail than by truck. In addition to MTSs, land-based long-term export contracts are used to export DSNY-collected waste from New York City, also by rail. While these mechanisms are beneficial for reducing truck traffic, disruptions to the operations of one mode (rail or marine transport) could result in a significant backup of waste, requiring alternative measures to transport the waste. **Table 22** summarizes the total annual mileage travelled by each mode of transport.

Table 21. Comparison of Waste Transportation Modes

Transportation Mode	Benefits	Impacts
Trucks	› In-city transportation › Flexible scheduling › Short-distance hauling	› Impact of air pollutant emissions on human health and environment › Noise pollution › Traffic congestion
Rail	› Long-distance hauling › Lower human health and environmental impact than truck transportation › High volume transportation mode	› Inflexible scheduling › Limited in-city availability › Limited route availability
Barge	› Short-distance hauling › Reduces congestion on roads and rail lines	› Limited destinations › Potential for water pollution › Impact of weather conditions on scheduling
Sources: LL152 Report 2023; "Cross-Harbor Car Float Operation Gets A Boost," Waterfront Alliance		

Table 22. Transport of DSNY-Collected Waste

Transportation Mode	Total Daily Tonnage, 2023	Total Annual Tonnage, 2023	Total Annual Miles 2022*
Rail	9,139	2,741,700	30,950,580
Truck	1,470	441,000	10,460,671
Barge**	4,384	1,315,278	60,338
Total* **	**10,609**	**3,182,700**	**41,411,251**

Notes:
*Data on miles travelled is available up to 2022
**Barge miles are nautical miles.
***Waste moved by barge is brought to transload facilities for long distance export by rail. Some waste is transported via truck and rail. This tonnage is not double counted in the total.
Sources: 2021-2022 DSNY Biennial SWMP Report, 2023 Disposal OpenData

Rail Infrastructure and Alternatives

DSNY waste transportation is highly dependent on rail. As of 2023, more than 85% of DSNY-collected waste is exported out of New York City by rail to landfills or incinerators. This is an average of over 9,000 tons of waste per day. Accordingly, developments and events affecting rail transport have significant consequences for the movement of waste out of New York City. The following section examines the limitations of rail infrastructure, planned rail projects that could impact waste management, and the potential risks associated with the dependence on rail.

Rail Infrastructure

New York City has extensive rail infrastructure; however, only a portion of the rail corridor is dedicated for freight use. Freight trains originating in Brooklyn, Queens, and the Bronx have no railway crossing over the Hudson River near New York City.[84] In fact, there are no designated rail bridges or tunnels for freight across the Hudson River south of Selkirk Yard, a major CSX rail classification yard near Albany. This means that New York City rail freight heading east of the Hudson may be forced to travel 140 miles north to cross the Hudson River.[85] This constraint is known as the "Selkirk Hurdle." A shorter route exists, but only through Staten Island via the Arthur Kill Bridge, a vertical-lift freight rail bridge connecting Staten Island's Port Liberty Terminal (Howland Hook Marine Terminal) to the port of

Elizabeth, New Jersey. Port Liberty Terminal (then owned by Global Container Terminal) announced the opening of on-dock rail service called ExpressRail via the bridge. In 2013, DSNY contracted with Reworld to barge containers of solid waste from transfer stations in Queens and Manhattan to the Port Liberty Terminal and export that waste by rail to Reworld incinerators outside of the New York City metro area. The Cross-Harbor Railcar Float, operated by PANYNJ, also allows for freight railcars to be barged across the Hudson River, from the 65th Yard in Brooklyn to Greenville Yard in Jersey City.[86]

Reworld, contracted by the City, loads containers filled with MSW onto barges at both the East 91st Street and North Shore MTSs in Manhattan. The barges transport the containers to Port Liberty New York container terminal on Staten Island, where the containers are transloaded onto railcars. From the terminal, this waste is primarily transported to Reworld's facility in Chester, Pennsylvania (Delaware Valley Resource Recovery Facility), and Reworld's Niagara facility (Niagara Resource Recovery Facility) in New York.

In Brooklyn, Waste Management, contracted by the City, loads containers filled with MSW onto barges at the Hamilton Avenue and Southwest Brooklyn MTSs. The barges transport the containers to Waste Management's Elizabeth Marine Terminal in Elizabeth, New Jersey, where they are trans-loaded onto trucks for a short dray to the CSX Transflo Facility in Elizabethport Yard in Elizabeth. From the Elizabethport Yard facility, the waste is transported to multiple landfills.

The Staten Island Transfer Station, operated by Republic Services, is served by the Arlington freight yard. From Arlington Yard, containerized waste is pulled to Oak Island Yard and transported by rail to the Lee County landfill in South Carolina.

Around 60% of the waste transferred at DSNY's marine transfer stations is exported through the Port Liberty Terminal, and 40% is moved by Transflo.

Waste Management is contracted to accept DSNY-collected waste at some of their private transfer stations in New York City. At the WM Varick Avenue private transfer station in Brooklyn, waste is loaded directly in containers, onto trucks, and transported to a nearby rail yard. Containers are loaded onto railcars and moved to the Bushwick New York & Atlantic (NY&A) rail yard. Waste is pulled to the Fresh Pond Junction. At the WM Review Avenue transfer station, material is loaded directly in containers and then loaded onto rail cars onsite. The containers are moved to the Blissville NY&A rail yard and pulled to Fresh Pond Junction. From the Fresh Pond Junction, containers of waste from both transfer stations are interchanged with CSX, and transferred from the CSX yard in Selkirk. From there, the waste is transported west or south to landfills. At the Harlem River Yard transfer station, material is containerized and loaded onto railcars onsite. Material is transferred through Selkirk and pulled south to landfills.

Ongoing and planned transportation projects may also impact the movement of waste by rail out of New York City. **Table 23** provides information on some of these projects, including project descriptions, status, potential impacts, relevance to waste transport, and lead agency.

Table 23. Regional Rail Projects Relevant to New York City Waste Export

Project	Description	Status	Expected Impact	Relevance to Waste Transport	Project Lead
Cross Harbor Freight Program	Infrastructure project to improve the movement of the freight across New York Harbor between the east-of-Hudson and west-of-Hudson regions.	Tier 2 Environmental Impact Statement underway	Reduce Truck Congestion	Improved freight infrastructure for movement of freight, potentially including waste out of New York City	PANYNJ*

Table 23. Regional Rail Projects Relevant to New York City Waste Export

Project	Description	Status	Expected Impact	Relevance to Waste Transport	Project Lead
Inter-Borough Express	Rapid transit project to connect Brooklyn and Queens, relying on existing infrastructure, including a dedicated freight rail line through New York City.	Planning	Increased transit options for underserved areas of New York City	Potential reduction of capacity for rail freight	MTA**
Penn Station Access	Project to connect Amtrak's Hell Gate Line to Penn Station and bring the line into a state of good repair, adding four4 new stations in the Bronx.	Under Construction	Improved access, connectivity, reliability, and on-time performance for commuters.	Potential impact on inner city and regional freight lines, as well as freight access during construction	MTA

Notes: EIS – Environmental Impact Statement; *PANYNJ – Port Authority of New York and New Jersey; **MTA – Metropolitan Transportation Agency
Current as of 2025

Sources: PANYNJ, Cross Harbor Freight Program[87]; MTA, Interborough Express,[88] MTA, Penn Station Access[89]

Rail Dependence

With the majority of DSNY-managed waste exported out of the City by rail, a disruption in the rail system, such as a rail worker strike, could have major repercussions for waste management in New York City. This was almost the case in 2022, when the railroad union strike loomed and threatened to shut down rail operations. While the strike was narrowly avoided, it underscores the need to ensure appropriate waste management for similar scenarios in the future.[90]

A disruption of the normal flow of waste from transfer stations to final disposal destinations can result in a backlog of waste at transfer stations, quickly exceeding their capacity as waste continues to arrive at these facilities. In 2023, over 9,000 tons of DSNY-collected waste was exported out of the city by rail daily. The City's Environmental Assessment Statement (EAS) for LL152 projected a slack capacity of 8,297 tons after the implementation of LL152. This means that if the average tons per day normally shipped out of New York City by rail were instead received and stored at transfer facilities in the event of a rail disruption, and no alternative measures to move waste were implemented, slack capacity would be exceeded in one day.[90,5]

Exceeding the capacity of waste transfer stations poses the following challenges:

- Emergency measures, such as identifying temporary storage sites and diverting waste to alternative facilities or utilizing alternative forms of transportation such as trucks may need to be implemented. These measures, however, may not be optimal or readily available, leading to further complications in waste management operations and potentially increasing costs of disposal.
- Logistical issues may arise, as there may be insufficient space to unload waste from incoming trucks and the increase in truck usage may cause significant traffic, delays, and bottlenecks, affecting the efficiency of waste management operations.

- Waste that cannot be promptly processed and transported to its destination may pose health and environmental risks such as odor generation, vermin infestations, the spread of disease, and increased probability of spills and leaks. These issues could impact nearby communities and the overall cleanliness of the city.[91]

The impact even slight disruptions could have on waste management in New York City underscore the importance of maintaining efficient waste transportation systems, reducing overall waste generation, and having contingency plans in place to mitigate the impacts of potential disruptions.

Additional Challenges to Waste Transportation and Management

Municipal waste transportation faces additional potential challenges outside of those associated with rail infrastructure. Efficient waste transportation by truck requires careful route planning to minimize distances traveled and idling while simultaneously optimizing collection routes and minimizing impacts on overburdened communities. However, the decentralized nature of waste generation can make it challenging to plan efficient routes, leading to increased travel distances and higher fuel consumption. Additionally, waste transportation trucks often must navigate through busy urban areas with high traffic volume. Traffic congestion can lead to delays, longer travel times, and increased fuel consumption, impacting the overall efficiency and cost of waste transportation operations. The Commercial Waste Zone (CWZ) program aims to address some of these traffic-related challenges for waste transported by truck.

In addition to the routine challenges of traffic congestion, emergency events such as natural and human-made disasters can greatly impact waste management. As a notable example, the COVID-19 pandemic had a significant impact on municipal waste operations worldwide. Listed below are some of the primary effects observed from the COVID-19 pandemic:

- **Changes in waste composition:** The pandemic brought about changes in waste composition due to altered consumption patterns. For example, residential and medical waste increased due to more household online shopping and medical personal protective equipment (PPE) use, while commercial waste decreased due to closures of businesses and expansion of remote work policies.[92]
- **Impacts on facilities:** Some waste, recycling, and composting programs and facilities experienced temporary closures or reduced operations, leading to disruptions in the waste management supply chain. This, coupled with changes in waste composition, created challenges for appropriate sorting and processing of recyclable materials.
- **Financial strain:** The pandemic placed significant financial strain on municipal waste operations. The increased costs associated with safety measures, budget cuts, and the need for additional resources to manage the surge in residential waste added financial pressure to waste management budgets.[93]

Emergency events from natural disasters, such as tropical storms or extreme heat or cold events, will increase in frequency and intensity due to climate change. Addressing challenges in waste collection, disposition, and increased recirculation of materials is essential to supporting New York City residents as waste collection or transportation may become unsafe during these events.

DSNY collaborates with the New York City Department of Emergency Services (DES) to anticipate and plan for emergency events, implementing various measures annually or seasonally to ensure appropriate management of waste materials in emergency situations.[94] To mitigate the challenges presented above, DSNY implements various measures, including adjusting collection schedules, increasing public awareness of proper waste disposal, providing

resources for recycling, and ensuring the safety of waste management personnel. Adaptations were made to address the evolving waste management landscape during the pandemic while maintaining essential services for city residents.

Waste travels out of New York in short-haul (less than 300 miles) and long-haul trucks (more than 300 miles). The current shortage of truck drivers, particularly of long-haul truck drivers, makes the future of reliable truck transportation of waste outside New York City uncertain. Truck driver shortages can be attributed to several factors, including the extended amount of time away from home, the tolls on drivers' health, and compensation. Recruitment and retention of new truck drivers is also challenging since the average trucking company has an annual turnover rate of around 90%. Additionally, truck drivers have a relatively high average age compared to other industries. As truck drivers retire, the number of actively employed truck drivers declines.[95,96] A truck driver shortage has the potential to impact New York City's waste export by increasing costs associated with waste export and delaying the export of waste beyond New York City.

Section 3. Private and Public Waste Management and Contracts

In New York City, commercially generated waste is managed predominantly by the private waste sector. This includes the collection, handling, and processing of commercial waste. Residential and institutional waste, on the other hand, is collected and managed by DSNY. However, DSNY may contract with private vendors for the processing and disposition of residential waste. Most New York City facilities for processing waste, including recycling, organics, MSW, and C&D debris, are privately owned and/or operated. New York City waste processors used by DSNY are listed in **Table 24** according to their ownership and operation status.

Table 24. New York City Facilities for DSNY-Managed Waste, 2023

Facility	Publicly Owned and Operated	Publicly Owned and Privately Operated (through DSNY Contract)*	Privately Owned and Privately Operated (through DSNY Contract)
Newtown Creek Wastewater Resource Recovery Facility (processes SSOs)	X		
DSNY South Bronx Household Special Waste Drop-Off Site	X		
DSNY Pike Slip Household Special Waste Dropoff Facility	X		
DSNY North Shore Household Special Waste Drop-Off Facility	X		
DSNY Muldoon Ave Household Special Waste Drop-Off Facility	X		
Waste Management Harlem River Yard (Bronx)			X
Waste Management Varick Ave TS (Brooklyn)			X
Waste Management Review Ave TS (Queens)			X
91st Street MTS		X	
Hamilton Avenue MTS		X	
Southwest Brooklyn MTS		X	
North Shore MTS		X	
Staten Island Compost Facility		X	
Soundview Park Compost Site		X	
Rikers Island Compost Site		X	
Staten Island Transfer Station		X	
American Recycling Transfer Station (Douglas Avenue)			X
Regal Recycling (Douglas Avenue)			X
Tully Environmental			X
Metropolitan Transfer Station			X
Waste Connections Court Street			X
SIMS Municipal Recycling (Greenpoint Avenue)			X
SIMS Municipal Recycling (Edgewater Road)			X
SIMS Municipal Recycling (2nd Avenue, Brooklyn)			X
Visy Paper of New York (Victory Blvd)			X

Source: 2021-2022 Biennial SWMP Report, 2024 Contract Board
Notes: *The Marine Transfer Stations and Staten Island Transfer Station are owned and operated by DSNY, but contract with private vendors for operational assistance with export activities

DSNY Contracts

To effectively manage waste generated in New York City, DSNY provides and contracts for waste transportation, handling, facility operations, and facility use for MSW.

Export and Disposal Contracts

Brooklyn Long Term Export Procurement (WM Varick Ave Transfer Station). The Brooklyn Long-Term Export Procurement requires the contractor to containerize, transport by rail, and dispose of approximately 1,088 tons per day of DSNY-managed waste from Brooklyn Collection Districts 1, 3, 4, and 5. Waste Management was awarded a 20-year service contract with two five-year renewals. The contract was first awarded in 2009. Management, operation, and maintenance of the Varick Avenue Transfer Station is also under the purview of Waste Management (WM). WM accepts waste from DSNY at the company's Varick Avenue Transfer Station in Brooklyn.

The Brooklyn Long-Term Export Procurement contract includes variable and fixed fees. The quantity of MSW delivered to WM by DSNY determines the variable fee. If there is unacceptable waste or waste that is delivered on Sundays or holidays, DSNY incurs an additional fee.

Rail service from Varick Avenue Transfer Station began in March 2009. Commercial waste must also be exported by rail as of October 2011.

Queens Long-Term Export Procurement (WM Review Avenue Transfer Station). The Queens Long-Term Export Procurement requires WM to containerize, export by rail, and dispose of approximately 975 tons of MSW per day. Waste managed at the Review Avenue Transfer Station is generated by Queens Collection Districts 1-6. WM was awarded a 20-year service contract in November 2013 for use of the Review Transfer Station.

DEC issued a permit modification that would allow for facility expansion and on-site rail. Service began at the facility in July 2015.

Bronx Long-Term Export Procurement (Harlem River Yard). Through the Bronx Long-Term Export Procurement, WM accepts DSNY-collected MSW at its Harlem River Yard facility and manages and transports the material by rail. WM was awarded a 20-year service contract with two five-year renewals in December 2007.

Intergovernmental Procurement for Disposal Services at a Regional Waste-to-Energy Facility (Reworld Essex County Resource Recovery Facility). Use of the Essex County Resource Recovery Facility is secured by a 20-year government-to-government agreement with the Port Authority of New York. The facility is located in Newark, New Jersey, and is operated by Reworld Essex. The contract began in 2012 and will expire in 2032 with no option for renewal.

Essex County Resource Recovery Facility manages up to 1,800 tons per operating day of DSNY-managed waste generated in Manhattan Collection Districts 1-3, 7, 9, 10, and 12. Through this agreement, MSW is disposed by incineration. Ferrous metal and electricity are recovered.

Marine Transfer Stations. Marine Transfer Stations (MTS) are operated under 20-year service contracts with two five-year renewals. Reworld Sustainable Solutions was awarded a contract for the North Shore and East 91st Street MTSs that went into effect in July 2015. WM was awarded a contract for the Hamilton Avenue MTS and Southwest Brooklyn MTS that went into service in September 2017 and October 2018, respectively.

DSNY owns and co-operates all four facilities. At these facilities, DSNY accepts waste and loads and lids waste containers. Service contracts require contractors to provide additional operational assistance to DSNY as described below:

- Hamilton Avenue MTS serves Brooklyn Collection Districts. The contract requires Waste Management to operate and maintain the cranes and manage the receipt and transport of loaded containers to an intermodal facility for trans-loading to rail transport and disposal. The facility opened in September 2017 and was fully operational by September 2018.
- East 91st Street MTS serves Manhattan Collection Districts. As a part of this contract, Reworld Sustainable Solutions is required to maintain and operate the cranes on the facility barge pier and the receipt of loaded containers for transport to and disposal at Reworld Resource Recovery facilities. The East 91st Street MTS began operations in March 2019.
- Southwest Brooklyn MTS serves Brooklyn Collection Districts. The contract was awarded to WM, which began operations in October 2018. The contract requires WM to operate and maintain the cranes on facility barge piers and manage the receipt of loaded containers for transport to an intermodal facility for trans-loading to rail transport and out-of-city disposal.
- North Shore MTS serves Queens Collection Districts. The MTS began operations in March 2015. Reworld Sustainable Solutions maintains and operates the cranes on the facility barge pier and the receipt of loaded containers for transport to and disposal at Reworld Resource Recovery facilities.

The Part 360 permits for the four converted MTSs have specific conditions related to the acceptance of commercial waste - limiting deliveries between the hours of 8 p.m. and 8 a.m. and capping the specific numbers of trucks in each hour of the delivery period to avoid noise impacts during the quiet nighttime hours, pursuant to the Final Environmental Impact Statement (FEIS) for New York City's 2006 SWMP. Permitted commercial waste maximum acceptance per day for the MTSs is as follows: North Shore – 1,000 tons per day (tpd); E. 91st Street -- 780 tpd; Southwest Brooklyn -- 718 tpd; and Hamilton Avenue -- 494 tpd. Now that the MTSs have reached full operation, only two currently have available capacity: East 91st Street and Southwest Brooklyn. To accept commercial waste, DSNY and its vendors would need to add additional staff and increase operating hours at these DSNY-owned facilities.

***S*taten Island Transfer Station.** DSNY operates SITS. The permit was first issued in March 2002 and renewed in 2007, 2012, and 2017. SITS accepts approximately 702 tons per day of DSNY-collected MSW from Staten Island. Republic Services, Inc. is tasked with operating the railyard and providing rail transportation and disposal for this waste, under a 20-year service contract that commenced in November 2006. In November 2026, the contract may be renewed for the first of its two five-year extensions periods.

Commercial Waste Zones Procurement

Local Law 199 was passed in 2019 and established the Commercial Waste Zone (CWZ) program. The program created 20 zones, which are serviced by up to three private waste carters per zone. Additionally, five contracts were awarded for city-wide containerized waste collection. This will result in 65 contracts distributed to vendors to support commercial waste management throughout the five boroughs.[68] The map in **Figure 10** depicts the boundaries of the commercial waste zones.

Figure 10. DSNY-Managed Organics Diversion Potential

Source: *Commecial Waste Zones Environmental Review Technical Memorandum*[97]

One purpose of the Commercial Waste Zone (CWZ) program is to reduce truck traffic associated with commercial waste collection in line with LL152. The expected impact is that truck traffic will be reduced by 50% while enabling the city to achieve several related goals such as improving safety, incentivizing recycling, and reducing air pollution.

DSNY began implementation of the Commercial Waste Zones Program.[97] A request for proposals (RFP) was issued to June 2021, with a follow-up RFP issued in November 2021. Final proposal review began at the end of 2022. Implementation of the program began in late 2024, with the CWZ operations in the first zone, Queens Central,

beginning in January 2025. The CWZ program may impact the quantity of waste processed at various private transfer facilities across the boroughs as well as the amount of material diverted for recycling, including organics.

Staten Island, Rikers Island, and Soundview Park Compost Facilities

The Staten Island Compost Facility (SICF), Rikers Island and Soundview Compost Facilities are windrow composting facilities owned by DSNY and operated under contract with Denali Water Solutions. The SICF contract began in 2018 and is in the first of two three-year renewal periods, which ends in June 2026. In 2023, SICF received around 30,000 tons of organic material, Soundview Park received 400 tons, and Rikers Island received around 3,000 tons.

Key Points

- In 2023, DSNY used just over 40% of their contracted capacity at putrescible transfer stations, including DSNY-owned transfer stations. DSNY sent about half of the waste it manages to DSNY-owned transfer stations, utilizing around 40% of their capacity. DSNY used over 60% of contracted capacity at private transfer stations that are under long-term contracts to accept DSNY waste.
- In 2023, half of the 14 private transfer stations in New York City that accepted putrescible waste used a majority of their annual capacity. Of the six facilities that accepted waste from DSNY and from the private sector, only one facility used most or all of its annual capacity. Overall, putrescible transfer stations have unused capacity allowed by their DSNY permits, indicating that the current transfer capacity is sufficient.
- The quantity of putrescible waste sent for disposal is expected to decrease from 2026-2036 with the implementation of waste reduction and diversion programs, so the current permitted capacity at New York City's transfer stations should be sufficient through the planning period. However, operational capacity can be more limited than permitted capacity when factoring in truck queuing and unloading, rail and barge loading, worker schedules, and storage capacity.
- In 2023, DSNY exported over half of the waste it collects to landfills in Virginia and South Carolina, and the remaining material was sent to landfills or incinerators in New York State, New Jersey, and Pennsylvania. Over two thirds of the waste DSNY manages were sent to landfills and around one third was sent to incinerators. 86% of waste managed by DSNY was transported to its final destination via rail, reflecting system reliance on rail and the ability to export waste long-distance.
- The existing MSW landfills in New York State are expected to reach capacity in 16 to 25 years, as reported in the New York State Solid Waste Management Plan. As part of the New York City SWMP, data was compiled for landfills in the Northeast region, as well as landfills in or around southern states that New York City sends waste to. This analysis found that capacity would be reached in approximately 25 years (based on 2023 data) if landfills continue to operate with their current annual acceptance rates and do not close or expand.
- DSNY-managed MSW was delivered to three incinerators in 2023, using around one-third of each facility's total capacity on average. DSNY has historically sent material to additional incinerators. While the number of individual incinerators receiving DSNY material has decreased, the proportion of waste sent for incineration has increased. Reworld Essex transfers and incinerates up to 400,000 tons of DSNY-managed waste annually, and this contract will end with no renewal option in 2032.
- The Northeast region has a disproportionate amount of incineration facilities compared to the rest of the country, with a total annual capacity exceeding 13 million tons. However, new incineration capacity is not

anticipated, as these facilities are difficult to site and have high operating and capital funding needs. Many incinerators in the United States have closed; 22 facilities closed between 2000 and 2018.

- The 2023 Waste Characterization Study found that organics comprise over one-third of NYC's residential waste stream. In 2023, under 5% of DSNY-managed organics were diverted for recycling (which includes composting, anaerobic digestion, and mulching). In 2025, over 9% of DSNY-managed organics were diverted. This rate is projected to increase to 15% in 2030 and nearly 30% in 2036.
- The current contracted capacity for DSNY organic curbside collections is around 390,000 tons per year. This capacity includes facilities that are contracted to pre-process and transfer organics, process organics, or transfer organics out of the City for processing. With the implementation of proposed programs in the SWMP, the tonnage of organics managed by DSNY is expected to exceed 440,000 tons in 2036, requiring additional capacity beyond what is currently contracted. A 2022 survey on regional organics facilities conducted by DSNY found that there are over 200,000 tons per year of potentially uncommitted capacity for organics management.

Endnotes

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Attachment D: National and International Factors Impacting Waste Management

According to *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*, a 2018 report by the World Bank, the amount of municipal solid waste (MSW) generated globally is estimated at more than two billion tons per year and is expected to increase by 70% to 3.4 billion tons by 2050.[1] The report noted that income level and waste generation are positively correlated; high-income countries generate around 34% of the world's waste despite having only 16% of the world's population.

In the report, the World Bank estimates that at least one third of the world's waste is mismanaged. Waste that is not managed responsibly pollutes stormwater, waterways, and oceans; leaches chemicals into soil and groundwater; and fills streets with litter. Many methods of recycling and disposal are preferable to open dumping but still have environmental and public health consequences.

Generally, current resource use is linear. Resources are harvested, processed into commodities, and disposed of after use. A circular "closed loop" economy would reduce and avoid waste by recovering 'waste' materials and reducing waste generation. Policy, economic factors, population growth, and funding influence waste generation and material recovery.

According to various sources,[2,3,4] the United States is one of the largest generators of both total and per capita municipal solid waste (MSW). MSW is produced by residential, commercial, institutional, and public activities. Other types of waste include construction and demolition (C&D) waste, industrial waste, hazardous waste, electronic waste (e-waste), and agricultural waste. Often, these other wastes make up most of a country's waste generation, with MSW accounting for only 5% or less in many countries.[5]

This attachment discusses major national and international factors and trends that directly or indirectly affect solid waste management in New York City. It provides an overview of disposal costs, recycled material prices, and system-level waste flow, including the following:

› Disposition Factors

- Landfill and incineration disposition costs and environmental considerations
- Recycling and disposition trends and prices by material type (metals, glass, plastic, paper, e-waste, textiles, construction materials, organics, and biosolids)

› Policy Factors

- Includes waste exports, national and international waste laws, adoption of recycling, and environmental justice

Each type of waste discussed in this attachment has numerous subtypes with a wide range of fluctuating market conditions. This attachment provides a broad overview of recycled material price information (which does not include

transportation costs, i.e., it is free on board, or FOB pricing) obtained at the end of 2022 and economic and political factors influencing waste management at that time.

Disposition Methods and Factors

In the past, common solid waste management methods in the United States included open dumping, open burning, and dumping material in the ocean and other water bodies. Open dumping is the disposal of waste on land without technology to mitigate environmental impacts. Sanitary landfills are distinct from open dumping due to the number of engineering measures used to avoid chemical leaching and emissions, including landfill gas capture systems, drainage systems, liners, and daily cover. Open burning is when waste is burned without environmental controls to reduce emissions and safely handle the remaining ash. Incineration facilities include measures to mitigate and reduce harmful emissions and may recover energy from waste combustion.

Higher-income countries commonly use landfills and incineration facilities for waste disposal and have outlawed open dumping and burning of most waste materials. However, landfills and incineration facilities are expensive to open and operate, leading lower-income countries to use open dumping and burning more commonly[6]. This issue is exacerbated by waste exports to lower-income countries. Since waste disposal within wealthy countries is more expensive due to operating and labor costs, a significant amount of hazardous and non-hazardous waste is exported to lower-income countries for disposal, recycling, or under the pretext of donation. These countries do not have the waste management infrastructure capacity to safely manage the large quantity of imported waste, and the material ends up in oceans, open dumps, and burned without emissions controls.[7]

Waste must be disposed of and recycled responsibly to mitigate major environmental impacts. Further, waste reduction is critical to environmental and public health. The current state of waste management perpetuates environmental harm and environmental burdens on the global south and environmental justice communities within the United States, as most waste management facilities in the U.S. are located in communities with marginalized populations. Moving towards a circular economy where waste is avoided and material is reused will improve environmental health and quality of life for all, and in particular communities located near waste management facilities.

Landfill and Incinerator Tipping Fees

The national unweighted average MSW landfill tipping fee (the cost to dispose, not including transport) was $54.03 per ton in 2021. The Northeast United States had the highest average tipping fees at $69.64 per ton. From 2018 to 2021, the tipping fees in the country increased by an average of 0.73% per year.[8]

The average MSW tipping fees for incineration facilities in 2022 ranged from $80 to $100 per ton. Tipping fees are the primary source of revenue for incinerators (including waste-to-energy [WTE] facilities). According to the American Society of Mechanical Engineers (ASME), WTE facilities struggle to maintain electricity prices that are competitive with other types of electricity generation. Expensive operating costs and limited revenue have contributed to the number of WTE facilities in the United States decreasing from 97 in 2001 to 75 in 2018.[9]

Composting and Anaerobic Digestion

In 2018, the U.S. Environmental Protection Agency (EPA) estimated that over 8% of the country's MSW was composted.[10] EPA defines composting as "a controlled, aerobic (oxygen-required) process that converts organic materials into a nutrient-rich soil amendment or mulch through natural decomposition." The finished product

(compost) is sold in retail settings, and prices vary widely depending on the location, retailer, or supplier. Compost may also be sold or distributed in bulk. Selling bulk compost can cut down on packaging and transportation costs for suppliers and is often much more affordable for the consumer. Prices for municipal compost depend heavily on municipal decisions and funding. Some municipalities leverage public-private partnerships for composting. To recover the operational costs of composting, facilities may need to generate revenue by charging tipping fees, selling compost, or establishing other forms of income.[11] Some municipalities charge nothing, or a small fee, for compost services or finished product.

The economics of composting depends on many factors. For example, municipal compost programs in the Seattle, Washington area had expanded around 2020, but the growth of compost use in agriculture lagged. To study the factors behind this, Washington State University researchers explored the cost and value of compost for local farmers. They estimated the price of compost per cubic yard, including transportation and spreading, to be about $27. They also estimated the potential value of compost from crop yields for multiple crop types. They concluded that at the price of $27 per cubic yard, the use of compost is economical only for higher-value crops, and that added value depends on the soil conditions to which compost is applied. Further, they identified that contamination from plastics in municipal compost is a major concern.[12]

The key factor for a successful municipal compost program is ensuring sources of feedstock that are consistent (collected routinely) and clean (uncontaminated and well separated). Some of the other factors that contribute to successful municipal composting programs include well-enforced waste diversion programs and regulations, funding (including subsidies and grants), multiple revenue streams to cover operating costs (e.g., compost sales, tipping fees), quality control and standards for product, and stakeholder partnerships (farmers, nongovernmental organizations, private sector).[13]

An additional method for the management of the organic fraction of the waste stream is anaerobic digestion (AD), which is the breakdown of these organic materials in an enclosed environment in the absence of oxygen by a class of microorganisms called methanogens. Anaerobic digestion is a proven method for managing waste, particularly in the wastewater treatment sector. The byproducts of digestion are biogas and digestate.[14] Over the past couple of decades, AD has been increasingly used to manage animal manure and food scraps in the U.S. Most digesters are operated by private companies; however, more and more publicly owned wastewater facilities have been expanding the use of AD for other organics such as food scraps and fats, oils, and grease.[15] New York City has 75 anaerobic digesters across 14 wastewater resource recovery facilities. The Newtown Creek facility in Brooklyn co-digests food and wastewater.

Emerging Technologies in Waste and Resource Management

Advanced Thermal Treatment

Advanced thermal treatment (ATT) includes pyrolysis and gasification **(see Attachment H**: **Review of Advanced Thermal Treatment Technologies)**. While incineration of waste and WTE technologies have been used extensively for waste management, ATT technologies are newer and not yet common, although major investments have recently been made in exploring the viability and potential uses of the technologies.[16] Incineration, a “mature” or long-standing type of thermal treatment, is the process of combusting waste in the presence of oxygen (burning). Pyrolysis is the process of thermally degrading waste in the absence of oxygen, which produces synthetic gas (syngas) and solid residue (char), a byproduct. Syngas can be refined into various forms, including liquid fuel. Pyrolysis is primarily used for plastics, with proponents touting it as approach to reclaim hard-to-recycle plastics and a way to address the low recycling rate of plastics in the U.S. (9%).[17,18] The gasification process is similarly used to produce syngas. Carbon-

based waste (biomass) and MSW are thermally degraded with a small amount of oxygen (partial oxidation). Gasification has existed for decades but has not been implemented for managing waste on a large scale, primarily due to technical barriers.[19]

Automated Material Sorting (Robotics)

Single-stream recycling—where metal, glass, and plastics are combined with paper into the same receptacle for collection—is the most common form of recycling in the U.S. It has increased in popularity since its introduction in the 1990s due to its convenience for the public. Alternatively, materials are separated for collection into various categories. This is known as clean-stream, dual-stream, source-separation, or multiple-stream recycling. Single stream requires more rigorous sorting than a system with separated materials and typically leads to higher contamination rates of materials.

While manual separation may be used for some materials, machinery is commonly used to support the separation of recycled materials. Mechanisms such as rotary or disc screens, magnet separators, air separators, and optical separators are used to automatically sort recyclables,[20] often with the support of personnel to remove contaminants before materials enter subsequent stages of processing. Artificial intelligence (AI) has been integrated into this machinery, enhancing the ability of machines to identify material types and sort them with higher accuracy.

The Sims Municipal Recycling facility in Brooklyn, New York, uses technology from EverestLabs to sort materials that are hard for workers to manually reach.[21] A robotic arm is used to sort materials after optically identifying them, and AI helps refine the process, gather information, and report on performance. This increases the speed and efficiency of the sorting process, which can help material recovery facilities increase recovery rates and reduce costs.

Software can be incorporated throughout the entire waste management process to aid in routing and logistics and to monitor the amount of waste handled and waste flow. Many companies provide software for waste management, and data is increasingly being used to troubleshoot issues and optimize daily operations in waste management companies.[22] Software can also be used to track municipal assets, such as sensors used in “smart” litter baskets to track contents and send alerts when the bins are full or if any hazards (such as a fire) occur. This allows waste management companies and municipalities to increase efficiency, improve sustainability, reduce contamination, and learn how to improve solid waste management long term.[23]

Sustainability

Greenhouse Gases and Air Pollution

When organic materials decompose in landfills, they produce a combination of carbon dioxide (CO_2) and methane gas, known as landfill gas (LFG). Methane is over 80 times more potent as a greenhouse gas (GHG) than CO_2 over a 20-year period.[24]

EPA estimated that in 2020, LFG accounted for 15% of methane emissions in the U.S, or 109.3 $MMTCO_2e$ (million metric tons of carbon dioxide equivalent—a unit for GHG emissions).[25] From 1990-2005, LFG generation increased by over 30%, but emissions dropped by 30% due to increased LFG collection.[26] This is largely the result of federal policy decisions that encourage or require increased LFG management and capture. The Resource Conservation and Recovery Act (RCRA) was amended in 1991, requiring landfills to be lined and covered. In 1996, a list of provisions under the Clean Air Act set emissions standards for MSW landfills containing over 2.5 million tons or 2.5 million cubic meters of waste.

Capturing LFG is an important emission reduction strategy. LFG can be flared (burned/reduced to carbon dioxide) or used in four ways for energy production: to generate electricity, as fuel for thermal heat, for cogeneration (combined generation of heat and electricity), or purified and distributed using utility gas infrastructure for residential, commercial, and industrial customer use.

EPA's voluntary Landfill Methane Outreach Program (LMOP) aids landfill owners and operators in the development of LFG projects that will reduce methane emissions. The program provides resources and technical assistance to support LFG energy projects.

Incinerators also generate emissions. EPA estimated that waste incineration in the U.S. resulted in 13.5 $MMTCO_2e$ in 2020.[27] In addition to GHGs, which are of concern due to their global effect on the climate, waste incineration produces air pollutants that are of concern at the local level due to their effect on public health. These pollutants include particulate matter, lead, mercury, dioxins, sulfur oxides, and nitrogen oxides. A 2019 study found that close to 80% of WTE incinerators in the U.S. are located in environmental justice communities (communities of color and/or low-income communities, which have historically been exposed to increased environmental health hazards and impacted by environmental issues). Living near incinerators is linked to adverse health effects and facility siting is an environmental justice concern.[28]

Effective composting can significantly reduce methane emissions by diverting organic waste from landfills. Compost also provides carbon sequestration and other benefits.[29] Composting is an important strategy for reducing GHG emissions from waste. Preventing food waste and thereby avoiding GHG emissions is even more effective.[30]

Circular Economy

The amount of waste produced globally and the resulting environmental and public health concerns have led to an international discussion of transitioning to a closed loop, or circular, economy where the primary goal is to prevent waste from being produced in the first place, as re-use and recycling are not enough to manage the sheer amount of waste generated.[31]

The international community is also increasingly considering the importance of sustainable materials management for climate change mitigation. A 2020 United Nations report calls for climate mitigation efforts through the improved use of resources, citing research from the International Resource Panel that linked natural resource extraction and processing to around half of global GHGs and over 90% of water stress and biodiversity loss. Maximizing the productive and efficient use of materials throughout their lifecycle (from resource extraction to disposal) would reduce waste and reduce the need for extracting and processing raw materials.[32,33] Given the scale of emissions associated with resource use, considering emissions on a lifecycle basis is important for moving towards the climate goals set by the Paris Agreement.

Transportation

New York City's freight network includes highways, marine terminals, rail lines and rail yards, airports, and distribution centers. Of 198 million tons of freight moved in New York City in 2016, 9% was waste and scrap metal.[34] Most of that waste was transported by barge, rail, and truck to other states. Data on the international export of waste and recyclable materials from New York City is limited. Available information and waste data from the Department of Sanitation and New York City agencies indicates that the City does not directly export publicly-managed waste or recyclables overseas. Data from USA Trade® Online, provided by the U.S. Census Bureau, indicates that the primary waste materials exported from New York City are paper products. USA Trade® data indicated that in 2024, around

60,000 tons of plastic scrap and 2.7 million tons of paper scrap were exported internationally from New York City. While some material is exported overseas by plane, the majority is exported on cargo ships.

Freight movement by barge and rail is more energy efficient than freight movement by truck. Average rail energy consumption is 283 BTU/ton-mile,[35] which is three to four times more energy efficient than moving the same amount of freight by truck.[36,37] Generally, transportation is becoming more efficient and less polluting over time. Additionally, moving freight (including solid waste) by barge reduces truck traffic through neighborhoods. In New York City, the use of barges and rail also reduces traffic and congestion on bridges and tunnels.

Freight NYC, a plan for freight transportation released by the New York City Economic Development Corporation in 2016, noted that the Port Liberty New York Terminal (formerly GCT) on Staten Island transfers about half of the city's volume of containerized solid waste.[34] Barges loaded with containerized municipal solid waste in Queens and Manhattan are unloaded at the terminal and put on trains. This water-to-rail transfer eliminates over 100,000 truck trips each year. The New York Metropolitan Transportation Council (NYMTC) *2018-2045 Regional Freight Plan* spans New York City, Long Island, and a portion of the Hudson Valley.[38] According to the plan, in 2012, before the Port Liberty terminal started handling New York's containerized waste, 84% of outbound waste movement within the planning area was by truck, 7% by water, and 9% by rail. The 2021 NYMTC Regional Transportation Plan reported that in 2018, 84% of waste and scrap exported from the NYMTC region was exported by truck, 5% was exported by water, and 11% was exported by rail.[39] NYMTC projected an almost 40% increase in waste tonnage transported across all modes of freight from 2018 to 2045.

While large amounts of waste are transported to disposition sites (landfills and incinerators) in other states, some of the recycled waste is processed locally. For example, Pratt's recycling facility on Staten Island makes cardboard boxes and other products out of paper and cardboard recycled in New York City. Also relatively local is Sims Municipal Recycling's Claremont glass plant in Jersey City. Some of the glass set out for recycling within New York City is turned into recycled glass aggregate (RGA) at the Claremont plant and used for construction locally. However, much of the recycled waste in New York City is transported over long distances to other states and overseas.

Recycled Material Markets, Prices, and Trends

Plastics

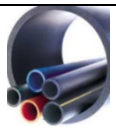
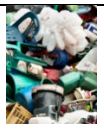
Plastic material set out for recycling is called plastic scrap or post-consumer material. Once plastic is processed and ready to use in new products, the material is called post-consumer resin (PCR). EPA estimated that in 2018, the U.S. generated 35.7 million tons of plastic waste, with a recycling rate of 8.7%. PET (polyethylene terephthalate) and HDPE (high density polyethylene) were recycled at rates of nearly 30%, which is higher than the recycling rate for other plastics.40 Estimates indicate that the recycling rate for plastics dropped to only 5-6% in 2021 due to increased plastic consumption and decreased recycling. Recycling rates were impacted by China's Operation National Sword Policy (see section "Operation National Sword and Basel Convention Amendments"), by which China banned imports of post-consumer plastic. Most material recycling facilities within the United States only accept PET#1 and HDPE#2 containers, reflecting limited capacity in the U.S. for plastic recycling.[41]

Table 1 provides information on types of plastic, products made from each type, and whether the material is recyclable into PCR using existing technology. While some types of plastic may technically be recyclable, that does not mean that the material is often recycled. For example, polystyrene can be recycled, but it is generally not economical or environmentally beneficial, so most recycling programs exclude the material.[42] Some products labelled "not accepted by recyclers" may be recycled, but not through curbside recycling programs.

Prices

Price of recycled plastics fluctuates and varies by type, as shown in **Table 1**. Prices were sourced from the Recycling Markets Limited Secondary Materials Pricing online database for the New York/Northeast region, accessed in November 2022.

Table 1. Plastic Recycling[43]

Name	Resin ID code[44]	Common uses[45]	Accepted for Recycling	Price[46]	Example
Polyethylene terephthalate (PET)	1	Food and beverage containers	Yes	9.75 ¢/lb	 Photo: Resource Recycling
High density polyethylene (HDPE)	2	Milk jugs, containers for household cleaners and detergents, cosmetics containers	Yes	HDPE: 62.25 ¢/lb Colored HDPE: 10.25 ¢/lb Rigid HDPE: 2.00 ¢/lb	 Photo: Secondary Material
Polyvinyl chloride (PVC)	3	Plastic packaging (bubble wrap), food foils, piping, insulation, electronics	No		 Photo: Greenbuildingsolutions.org[47]
Low Density Polyethylene (LDPE)	4	Films, including for shopping bags and wrappings; squeeze bottles, caps, and closures	Sometimes	Films: Grade A: 17.00 ¢/lb Grade B: 6.50 ¢/lb Grade C: 1.50 ¢/lb	 Photo: Resource Recycling
Polypropylene (PP)	5	Furniture, automobile parts, toys, luggage, lining	Yes/ Sometimes	5.50 ¢/lb	 Photo: Waste360.com[48]
Polystyrene (PS)	6	Foam packaging and utensils (food service), toys, trays, CD cases, bags, appliances	Rarely	Polystyrene EPS: 2.50 ¢/lb	 Photo: Resource Recycling
Other (miscellaneous plastics)	7	Nylon, acrylic, polycarbonate, fiberglass, sunglasses, electronic cases, DVDs, and signs and displays	No		 Photo: Ernest Packaging Solutions[49]
Compostable/ biodegradable plastic (7PLA)	7PLA[50]	Polylactic acid (PLA) and polyhydroxyalkanoate (PHA); packaging, textiles, films, utensils, sutures, and other medical uses[51]	No		 Photo: Phys.org[52]
Other: Commingled #1-7 Commingled #3-5 Mixed bulky rigid	1-7 3-7 7	Various	Sometimes	-1.00 ¢/lb (recyclers must pay for processing) 0.75 ¢/lb 4.50 ¢/lb	 Photo: Resource Recycling

Trends

The global PCR market was estimated to be worth $31.5 billion in 2022[53] and is forecast to grow to $43.9 billion by 2028, with a compound annual growth rate (CAGR) of 5.7%. PCR has gotten more expensive in recent years.[54] In 2014, recycled PET was cheaper than virgin PET by nearly $400/ton. In 2021, recycled PET cost $184 per ton more than virgin.[55] This may be attributed to increased consumer demand, lower supplies of PCR than virgin material, and increased chemical recycling. Chemical recycling involves a combination of heat, solvents, and chemical treatments to break down plastics into raw secondary materials that can be used to create new products.

Prices for feedstock (plastic scrap), however, remain low. In August 2022, Resource Recycling reported that prices for post-consumer PET containers had dropped by 60% from July to August that year. The article listed higher fuel costs, fears of a recession, oversupply of plastic scrap feedstock in the market, and end-user summer factory shutdowns (production breaks) as influential factors, noting that trends for recycled products often indicate and align with broader economic trends.[56] Economies that decouple the market for recycled plastic from the market for raw plastic are better protected from crude oil price volatility. Policies that require the use of recycled plastic in products support the development of end markets for the material. For example, the European Union's Packaging and Packaging Waste Regulation (PPWR) requires 30% recycled plastic content in all single-use plastic bottles and PET packaging, and 35% recycled plastic content in other plastic packaging by 2030. By 2040, single-use bottles and other plastic packaging must contain 65% recycled material, and other PET packaging must contain 50% recycled content.[57]

With growing concerns about plastic pollution, the United Nations (UN) Environment Assembly unanimously endorsed a resolution to end plastic pollution and embarked on the effort to forge an international legally binding agreement to prevent and reduce global plastic pollution from the full life cycle of plastic. The agreement was originally intended to go into effect in 2024.[58] A consensus was not reached at the fifth UN Environment Assembly in 2025.[59]

Metals

Metals are categorized as either ferrous or nonferrous. Ferrous metals contain iron and have magnetic properties, which helps processors sort and isolate the material. Ferrous metals are also the largest category of metal found in MSW in the U.S. The EPA reported that the country generated over 19 million tons of ferrous metals in 2018, with an average recycling rate of 60%.[60]

Prices

The prices of scrap metal fluctuate and vary based on the metal type, how it is delivered to recycling facilities (e.g., baled, loose, densified), and whether it is sorted or mixed. A few examples based on end of 2022 price information (from ScrapMetalBuyers.com and Recycling Markets Limited,[61]) include the following:

- Aluminum cans: $1,150/ton to $1,350/ton (¢57.50/lb to ¢67.50/lb)
- Steel cans: $2.50/ton to $180.00/ton
- White goods (major appliances such as washing machines): $42.50/ton
- Shredded steel scrap: $372/ton
- Iron: $87.00/ton
- Copper: $0.08/lb (copper transformers) to $2.40/lb (#1 bare bright wire)

Trends

Changes in the price of new metals, distances over which metals must be transported for processing, the cost of transport fuel, and international demand and policies surrounding scrap metal affect the price of metal feedstock and recycled metals. The global metal recycling market is anticipated to grow by 70% from 2021 to 2030 due to a projected construction increase in Europe and Asia-Pacific, leading to greater demand for metal in general, as well as concerns about GHG emissions and environmental regulations, leading to greater demand for recycled metals specifically.

Oil prices increased from 2021 to 2022, reducing demand for raw materials for steel production, since raw materials require more processing (and energy) to be manufactured into product than recycled materials. Electric arc furnaces can produce recycled steel with 100% scrap feedstock with no reduction in quality. Raw materials used to make steel include iron ore, limestone, and coal. Recycling scrap metal helps conserve resources—one metric ton (MT) of scrap can replace over 2.25 MT of raw feedstock and reduce pollution and energy use associated with mining.[62] Shredded iron scrap is worth significantly more than iron ore. Shredded iron scrap prices peaked at over $600/ton in March 2022 and dropped to under $400/ton by the end of 2024[63].

The global metal recycling market is expected to reach $384 billion by 2030, with a CAGR of 5.85% from 2020.[64] Prices for metals recovered from curbside recycling (aluminum and steel cans) have held steady from 2021-2022 as compared to more volatile prices for other curbside materials, such as paper and plastic.[65]

Glass

EPA estimated that the United States generated 12.3 million tons of glass in 2018 and recycled 31% of glass containers.[66] Glass bottles and jars can be recycled endlessly without reduction in quality, and recycled glass can be substituted for up to 95% of raw material. States with container collection policies (bottle bills) achieve average recycling rates of 63%, while those without achieve around 24%.[67]

Glass brought for recycling is processed into cullet, which is ready to be put in the furnace to be made into a new product. Flint glass is clear glass. Amber glass is created with the addition of iron oxide, resulting in a glass that blocks UV light. Green glass is usually created with chromium oxide. Other additives may be put in glass to achieve additional colors. Some types of glass, including heat-treated or tempered glass, borosilicate or aluminosilicate glass, and laminated glass, used to make products such as crystal, window glass, and kitchenware, cannot be recycled into containers and must be processed separately. Other reasons that glass may not be recycled include contamination or glass pieces that are too small.[67]

Prices

The prices of recycled glass fluctuate and vary by color of recycled glass delivered, as illustrated by the following prices sourced from Recycling Markets Limited in 2022:

- Flint (clear): $50/ton
- Amber: $35/ton
- Green: $7.50/ton

Recycling facilities may need to pay to send glass that is mixed, contaminated, or shattered to landfills for disposal.

Trends

Glass recycling is more energy efficient than manufacturing glass with raw material. Cullet melts at a lower temperature than raw material, reducing energy demand for process heating. Recycling materials keeps them out of landfills and reduces the need for mining and processing raw material. Recycling glass can also reduce water pollution associated with glass production by 50%, and air pollution by 20%.[68] Financial incentives and sustainability policies are likely to continue increasing the demand for recycled glass products.[69] The global glass market is projected to grow from around $3.4 billion in 2022 to nearly $4.6 billion in 2028, with a CAGR of 4.1%. Predicted growth is attributed to increasing demand for more sustainable packaging and packaged goods, use of glass in construction, and reduced energy consumption when using recycled glass in manufacturing.[70]

Paper

Paper generation peaked in 2000 at 87.7 million tons and has since decreased, likely due to increased ability to share and store information online instead of in print. EPA reported that, in 2018, paper and cardboard materials were the largest component of MSW, with 67.4 million tons generated and around 46 million tons recycled (over 68%) nationwide.[71] Using data from the American Forest & Paper Association (AF&PA), EPA estimated the following paper recycling rates for 2018:

- Newspapers: 64.8%
- Non-corrugated containers/packaging: 20.8%
- Corrugated boxes: 96.5%

In 2022, AF&PA estimated that over 90% of old corrugated cardboard is recycled.[72]

Prices[46]

As with other recycled materials, the price of recycled paper products fluctuates and varies by type and level of contamination and mixing. Some examples of the range of prices follow, sourced from Recycling Markets Limited in 2022:

- Old corrugated cardboard: $37.50/ton
- New double-lined corrugated cuttings: $55.00/ton
- Sorted office paper: $255.00/ton
- Sorted white ledger: $287.50/ton
- Coated book stock: $165-$180/ton

Trends

The global recycled paper market is expected to grow with a CAGR of 3.8% from $32 billion in 2021 to $42 billion in 2028.[73] Recycled paper prices were volatile between 2019 and 2022, dipping into the negatives (requiring entities to pay for paper materials to be recycled) in early 2019 and 2020, rising in 2021, and dipping again in October 2022.[74] COVID-19 and international policy changes (see section “Operation National Sword and Basel Convention Amendments”) disrupted recycling markets significantly. Factors that have had a positive effect on the U.S. recycled paper market include increased exports of paper products to other countries; sustainability initiatives increasing demand for recycled paper products; and about $5 billion of U.S. investment in paper processing infrastructure.[75]

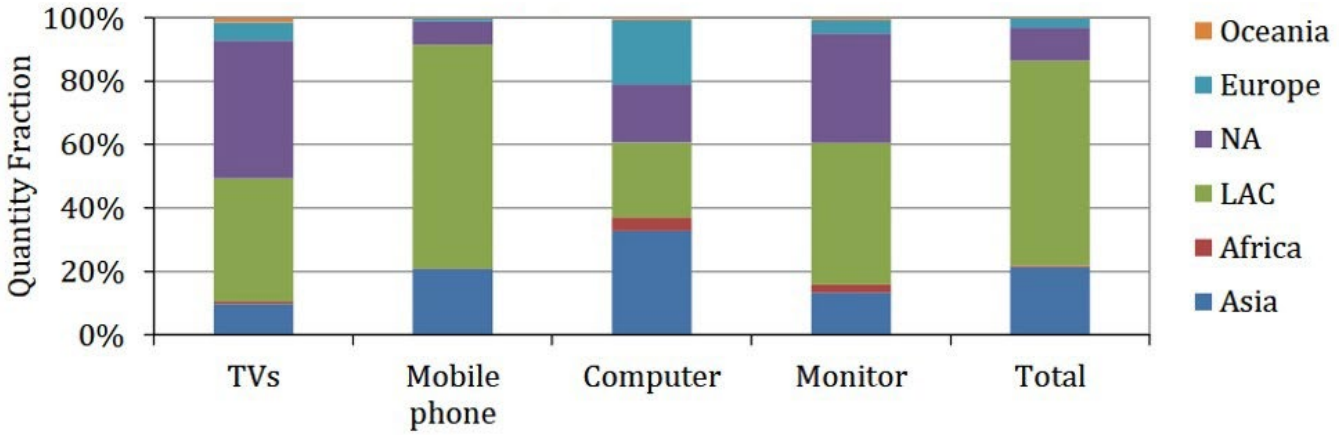
From January to November 2021, U.S. recovered fiber exports increased by 13%. The major importers of U.S. old corrugated cardboard and mixed paper were India, Southeast Asia, Mexico, and Brazil.[74]

Electronic Waste (E-waste)

Electronic waste generation increased by over 80% from 2010 to 2022, and only 22% of the material is properly collected and recycled.[76] The United States International Trade Commission (USITC) released a 2013 study[77] reporting that the United States—the world's largest market for new electronic products—had over $19 billion in domestic sales of used electronic products in 2011. The study estimated that the U.S. exported $1.5 billion of used electronic products, or 7% of the market. In a study for the StEP (Solving the E-Waste Problem) Initiative, researchers from the Massachusetts Institute of Technology Materials Systems Laboratory and National Center for Electronics Recycling studied the domestic and international flows of used electronics (see **Figure 1**).[78] They noted that in 2010, mobile phones accounted for the greatest number of used electronics items, TVs accounted for the largest tonnage of generated and collected used electronics while monitors comprised the largest volume.

The USITC study estimated that countries in the Asia-Pacific region imported the largest amount of used electronics from the United States. The following countries were grouped together as the Asia-Pacific region for this analysis: Korea, Japan, Australia, Malaysia, New Zealand, Pakistan, the Philippines, Singapore, Taiwan, Thailand, and Vietnam. China and Hong Kong were counted separately and are also listed as major importers, along with Mexico, India, and Canada. The StEP study found that large or heavy electronics products such as TVs and monitors are more likely to be exported from the U.S. to neighboring North American, Latin American, and Caribbean (LAC) countries. Major importers of mobile phones include LAC countries and Asian countries. Computers are commonly exported to European and Asian countries. Africa is the least common destination for used electronics.

Figure 1. United States Exports to Region by E-Waste Product



Source: *Duan, Huabo, et al. "Quantitative characterization of domestic and transboundary flows of used electronics."*[78]

Prices

Discarded electronics prices fluctuate and vary, as shown in the following examples, sourced from Scrap Metal Buyers in December 2022:[79]

- Lithium-ion batteries: $1.50-$2.50/lb
- Motherboards: $0.55-1.15/lb
- Memory chips: $5.50-$7.50/lb
- CPU p chips: $3.00-$25/lb
- Whole computer towers with hard drive: $0.12/lb
- Laptops: $0.50/lb

Trends

A significant growth in the global electronics recycling market is projected—from $32.5 billion in 2020 to $65.8 billion in 2026; a CAGR of 12.7%.[80]

Textiles

The EPA's "Advancing Sustainable Materials Management: 2018 Fact Sheet"[81] shows that textile waste generation in the U.S. has increased dramatically since the 1960s, rising from 1.76 million tons in 1960 to 9.48 million tons in 2000 to over 17 million tons in 2018. Fast fashion has contributed to the growing production and disposal of textiles. A 2017 report[82] found that annual clothing sales doubled from 2000 to 2015, and the average number of times clothing is worn has decreased by 36%. Less than 1% of the material used to create clothing is recycled into new garments. The EPA estimated that less than 15% of the 17 million tons of U.S. textile waste generated in 2018 was recycled.[83] About 700,000 tons per year of used clothing are estimated to be exported overseas for reuse, recycling, or disposal.[84]

Standardized prices for textiles are challenging to specify. There are a variety of sources of available pre- and post-consumer textile waste, and much of the waste is comprised of clothing donations. A substantial proportion of the material ends up disposed of domestically or overseas, as discussed in the section "African Textile Imports" of this attachment.

National and Global Policy and Trends

Resource Conservation and Recovery Act (RCRA) Regulations

The 1976 Resource Conservation and Recovery Act (RCRA) is the primary law on solid waste and hazardous waste disposal in the U.S. The law was created to allow the EPA to track the generation and movement of hazardous waste and to set requirements for its management. Types and amounts of hazardous waste must be reported by waste generators, transporters, and hazardous waste treatment, storage, and disposal facilities. RCRA sets standards for hazardous waste management to reduce pollution and leaching, minimizing threats to human and environmental health and safety.

RCRA also sets standards for the handling, recovery, and disposal of non-hazardous waste materials. States must implement permit programs and enforce standards for waste disposal facilities and waste to energy facilities. RCRA also requires states to create state solid waste management plans, which document allocation of federal funds, as well as state infrastructure and programs related to waste management, resource recovery, and conservation.[85]

Waste Flow Control Laws

Flow controls are legal provisions that allow local governments and states to designate where MSW is taken for processing, treatment, or disposal. EPA's 1995 *Report to Congress on Flow Control and Municipal Solid Waste* found that 35 states, including New York; New Jersey; Pennsylvania; Washington, D.C.; Vermont; and Connecticut explicitly authorize the use of flow control.[86] Flow control is a legally contentious aspect of solid waste management regulations. Flow control provisions may be implemented to support the use of publicly-owned solid waste management facilities or local facilities, but in some cases this has been considered a violation of the Commerce Clause. The Commerce Clause[87] (Article I, Section 8, Clause 3 of the U.S. Constitution), gives Congress the power to regulate international and interstate commerce. State and local governments may participate in the market, which includes buying or selling goods and services and selecting business partners. However, as interpreted by the courts, the Commerce Clause "prevents state and local governments from impeding the free flow of goods from one state to another" and "prohibits protectionist state regulation designed to benefit in-state economic interests by burdening out-of-state competitors."[88]

In New York, the State provides authorization for municipalities to implement flow control provisions. Flow control may be applied to source-separated recycling materials, which is not the case in many other states. As reported in New York State's 2010 *Beyond Waste* plan,[89] the 1994 *C&A Carbone v. Town of Clarkstown* case dissuaded municipalities from enforcing their flow control laws. Clarkstown filed suit against C&A Carbone—a company that operated a local recycling facility—after discovering that Carbone self-hauled nonrecyclable waste out of state. The Town of Clarkstown had funded the Route 303 private transfer station, which it planned to buy for $1.00 after five years of operation.[90] The town mandated that all haulers bring nonhazardous solid waste to this transfer station, requiring them to pay the tipping fee and barring them from exporting waste themselves. C&A Carbone, along with other related businesses and persons, responded by filing a lawsuit. District and state courts ruled that the flow control was permissible, but these decisions were overturned by the United States Supreme Court, which determined that the Town of Clarkstown had violated the Commerce Clause.

In New York, Oneida and Herkimer counties were challenged for requiring waste haulers to dispose of waste in designated publicly owned facilities. In this case, the U.S. Supreme Court found that the flow control ordinances did not discriminate against interstate commerce because although they benefitted a public facility, all private companies were treated the same.

In 1996, the United States District Court for the District of New Jersey in *Atlantic Coast Demolition and Recycling, Inc. v. Board of Chosen Freeholders of Atlantic County*[91] determined that New Jersey's solid waste flow control laws restricted access to New Jersey's waste management markets. New Jersey's system required waste management facilities to obtain a contract with one of the state's waste management districts and receive approval from the New Jersey Department of Environmental Protection (NJDEP). While out-of-state facilities could technically meet both requirements, this rarely occurred. A clause in NJDEP policy required districts seeking approval on contracts with out-of-state facilities to prove that waste management facilities within the district did not meet their needs.[92] The court determined that these "self-sufficiency" requirements favored in-state waste management and required adjustment. Since then, the State of New Jersey and some municipalities have filed appeals against the decision. NJDEP currently has mandates[93] on where certain waste types generated by certain counties may be disposed. Specifically, some New Jersey counties have open markets, while others require specific waste types (largely MSW and putrescible waste) to be disposed of at certain locations.

In summary, some courts have found certain flow control policies to be unconstitutional, while others have not. Enacting or enforcing flow control policies has the potential for legal challenges.

General Legislative and Programmatic Trends in the United States

In recent years, many policies have been proposed at the federal level to address waste and recycling. In 2020, the Save Our Seas 2.0 Act was signed into law to address plastic pollution in waterways. This resulted in $55 million a year in funding for improved local recycling programs and infrastructure and $10 million in grants for water and wastewater infrastructure or anti-litter initiatives.[94] The Save Our Seas Act included an official definition of the circular economy for the first time in U.S. law:

> The term "circular economy'' means an economy that uses a systems-focused approach and involves industrial processes and economic activities that—
>
> (A) are restorative or regenerative by design;
> (B) enable resources used in such processes and activities to maintain their highest values for as long as possible; and
> (C) aim for the elimination of waste through the superior design of materials, products, and systems (including business models).[95]

The 2021 Infrastructure Investment and Jobs Act (IIJA) provided $350 million for solid waste and recycling grants, $75 million in grants for public education and outreach related to recycling, $275 million of funding to implement the Save Our Seas 2.0 Act, and $100 million in pollution prevention. It also required the EPA to develop a model recycling program toolkit to help improve recycling.

In 2021, plastic waste and recycling remained in the federal spotlight with the introduction of bills including the Break Free from Plastic Pollution Act, the CLEAN Future Act, the Ocean-Based Climate Solutions Act, and the Plastic Waste Reduction and Recycling Act. Despite concerns over plastic waste, these bills were not passed by Congress in 2022, although they may be reintroduced in the future.[96] However, EPA released the *National Recycling Strategy* in 2021, setting a goal of 50% recycling rates nationwide by 2030. The 2019 *National Framework for Advancing the U.S. Recycling System* kicked off the effort to identify actionable methods to reduce contamination, improve collection and infrastructure, optimize markets and national policy, and collect standardized data.

The 2022 Inflation Reduction Act resulted in significant investments in climate and sustainability initiatives, expanding funding and tax credits for various forms of renewable energy, as well as improved, or expanded biogas collection, ATT, and WTE infrastructure. It also set aside almost $5 billion for procurement and projects increasing the use of low-carbon building materials, with the potential to affect C&D material recycling and reuse.[97]

The North American Leadership Summit is held to identify shared goals of the U.S., Canada, and Mexico, and increase cooperation. At the most recent summit in January 2023, leaders agreed that responding to the climate crisis and building clean economies was a top priority.[98] Commitments that resulted from the summit include a 15% reduction of methane emissions from the solid waste and wastewater sector by 2030; commitment to achieving the Global Methane Pledge,[99] and creating a Food Loss and Waste Reduction Action Plan by 2026 to cut food waste/loss in half by 2030. The current United States' policy is in flux and international trade agreement changes may affect resource use and conservation in ways that are not yet clear.

Extended Producer Responsibility (EPR)

Extended producer responsibility policies hold manufacturers responsible for the recycling or disposal of the materials they produce that end up in the waste stream. Producers may be financially and/or physically responsible for the collection, disposal, and recycling of materials. This is an effective way to reduce waste at its source and increase

the recycling or safe disposal of materials.[100] EPR policies are particularly helpful for materials that are challenging for municipal waste systems to handle, such as electronic waste and batteries.

In June 2022, California joined Colorado, Maine, and Oregon in passing EPR policies for producers of packaging. California's SB 54 requires all plastic packaging in the state to reach a 30% recycling rate by 2028 and 65% by 2032. It also imposes fees on manufacturers, distributors, and retailers of single-use packaging (with limited exceptions), affecting most businesses and food-service establishments. By 2032, producers of single-use packaging must ensure that their products are recyclable or compostable. The bill also seeks to standardize the materials accepted at material recovery facilities throughout the state to aid with compliance. California's packaging recycling goals are significant and accomplishing them will require major action and monitoring on local, regional, and state levels to ensure proper implementation.

Biosolids

Biosolids result from the separation and processing of liquid and solid waste material during wastewater treatment. Biosolids are semisolid and nutrient-rich products of treated wastewater. Biosolids are categorized into Classes A and B based on treatment methods. Sewage sludge, an intermediate product of wastewater treatment, can contain pathogens (bacteria, viruses, protozoa, and helminths), metals, and other pollutants. Class A biosolids are those that have been treated to reduce the presence of pathogens to the extent that there are no restrictions or special handling requirements. Class B biosolids are those that have undergone treatment that has reduced but not eliminated pathogens and may only be used in limited settings until natural pathogen die-off occurs.[101] New York requires solid waste permits for the use of Class B biosolids, and they are typically applied to farms and to forestry and land reclamation projects that have limited public access.[102] Class A biosolids with exceptional quality (low metal and pathogen content) may be sold to the public as a soil amendment (material added to soil to improve its properties for plant growth).

Biosolids and sewage have been landfilled or applied to cropland in Europe and the U.S. since the nineteenth and twentieth centuries, with the United States. aiming to increase beneficial land application since the 1970s.[103] Sewage sludge had also been dumped in the ocean, which was made illegal by the 1988 Ocean Dumping Ban Act.[104] Sewage sludge may be incinerated, but sewage sludge incinerators are subject to Clean Air Act regulations, which became more stringent in 2011, discouraging this method of biosolids management. Federal biosolids regulations including standards for use and disposal were established in 1993 under the Clean Water Act (40 CFR Part 503, Standards for the Use or Disposal of Sewage Sludge). By the year 2000, 60% of biosolids in the United States were land applied.[103] In 2023, 60% of the biosolids tracked by the EPA were land applied, with 31% used for agriculture, 1% used for land reclamation, and 28% used for landscaping, gardens, and other uses.[105]

EPA oversees permitting for biosolids management in 41 states, including New York and surrounding states. New York has a statewide permitting program managed by the New York Department of Environmental Conservation (DEC). Larger public facilities that use land application, incineration, or surface application to dispose of biosolids are subject to reporting and recordkeeping requirements, pollutant limits, pathogen and vector attraction reduction, monitoring, and other management practices.

The Clean Water Act requires EPA to review biosolids regulations every two years. If EPA identifies additional pollutants in biosolids and determines that they present a risk to human health or the environment, EPA conducts pollutant risk screening and risk assessments, which may result in more regulation.

Land application of biosolids can be controversial due to safety and environmental concerns related to pollutants. In 2018, EPA's Office of Inspector General (OIG) released a report titled *EPA Unable to Assess the Impact of Hundreds*

of Unregulated Pollutants in Land-Applied Biosolids on Human Health and the Environment.[106] According to the report, EPA regulates and monitors the presence of nine heavy metal pollutants in biosolids. Since 1989, over 350 pollutants have been identified in biosolids, about 60 of which are designated as hazardous in other EPA programs. Other pollutants that have been identified include pharmaceuticals, hormones, flame retardants, Bisphenol A (BPA),[107] polyfluoroalkyl substances (PFAs),[108] and polychlorinated biphenyls (PCBs).[109,110] The report discusses the challenges faced by EPA and the resulting effect on biosolids regulation and makes numerous recommendations for program improvement. The OIG report was met with criticism from the scientific community. The U.S. Department of Agriculture's Multistate Research Committee, known as W4170, published a rebuttal of the OIG report, noting that many of the pollutants present in biosolids have been studied by the EPA and are not present at concentrations that pose unique risks, though some pollutants identified should be studied further.[111]

In 2018, approximately 50% of the biosolids in the U.S. were beneficially used, according to the National Biosolids Data Project (NBDP).[112] The global biosolids market value was estimated at $1.4 billion in 2018, with expected growth to $1.9 billion by 2025.[113] Agriculture is the primary end-use for biosolids worldwide, but biosolids may be composted or used for the following:

- Fill material (used to level ground, often in construction)
- Forestry and landscaping
- Alternative daily cover or final cover at landfills (layers of material used to "seal" landfills daily or after landfill closure)
- Land reclamation (improving the ecological conditions of disturbed land, such as closed mine sites)[114]
- Heat generation (biosolids may be used for fuel via conversion to pellets, biofuel, etc.)[115]

In 2019, half of the world's population lacked adequate access to safe drinking water, sanitation, and hygiene, causing approximately 1.4 million deaths that year.[116] Many lower-income countries are still developing wastewater treatment infrastructure and policies. Middle and higher-income countries that have developed wastewater treatment infrastructure vary in their approach to biosolids management, as shown in **Figure 2**. Factors that influence land application of biosolids include availability of land, use of incineration and anaerobic digestion, public acceptance of land application, and public acceptance of landfilling. As of the 2009 report *Global atlas of excreta, wastewater sludge, and biosolids management: moving forward the sustainable and welcome uses of a global resource*, direct land application of minimally treated biosolids (biosolids classified as Class B in the U.S.) is diminishing in high-income countries. In Australia, landfilling is not considered a beneficial or acceptable use of biosolids, resulting in a high material recovery rate. Some countries, such as Japan, which incinerated around 70% of its biosolids, favor incineration with energy recovery and anaerobic digestion due to high fuel costs. Slovakia's high rate of composting is attributable to a lack of incineration capacity, and prioritization of beneficial use of over landfilling.[117]

Figure 2. The Role of Biosolids Recycling to Soils in Middle- and Higher-Income Countries

~ 5% and growing (current %)	> 30% and growing (current %)	> 60% and growing (current %)	Holding steady (current %)	Diminishing (current %)	Already very little use on soils
Brazil (15%)	Canada (33%)	Australia (81%)	Italy (69%)	Austria (65%)	Japan (14%)
Bulgaria (~5%)	China (50%)	Czech Republic (67%)	USA (55%)	Germany	Netherlands
Jordan (~0%)	European Union (~40%)	New Zealand (66%)	Norway (~95%)		Switzerland (0%)
Mexico (~0%)	Hungary (39%)	Slovakia (69%)			
Turkey	Portugal				

Source: *LeBlanc, Ronald J., Peter Matthews, and Roland P. Richard, eds., "Global atlas of excreta, wastewater sludge, and biosolids management: moving forward the sustainable and welcome uses of a global resource."*[117]

C&D Waste Policies and Trends

C&D materials that are not recycled are generally sent to landfills. With landfill capacity diminishing across the country and green building practices becoming more prevalent, the demand for C&D waste processing and recycling is increasing. Many states have been expanding goals and requirements for C&D waste recycling. New York Senate bill S6339, if passed into law, would require contractors to reuse or recycle a minimum of 25% by weight of their C&D debris initially, and a minimum of 50% the following year.[118]

New and renovated buildings are increasingly pursuing green building certifications. The Leadership in Energy and Environmental Design (LEED) rating system for green building certification encourages projects to send at least 50% of construction waste materials to recycling facilities. Municipal and state regulations regarding the handling of C&D waste are also becoming more common. For example, Maine strengthened recycling requirements in 2022 and prohibited out-of-state C&D debris from being brought to the state-owned Juniper Ridge Landfill.[119]

Source separation and recovery of C&D materials can be challenging. Buildings are often not designed for easy deconstruction, and construction sites may not have enough space for the contractor to separate materials. Demolition can also be messy, which increases contamination rates. Some materials, such as composites, flooring, and insulation, are difficult to recover.[120] Despite this, the global C&D waste recycling market is expected to reach $149 billion by 2027. Awareness among individuals, businesses, and government agencies on the benefits of recovering C&D materials is a driver of C&D waste recycling.[121]

Deconstruction

EPA estimated that the United States generated over 600 million tons of C&D debris in 2018, which is more than double the amount of MSW generated in 2018.[122] While it is possible to recycle C&D debris after buildings are demolished, deconstruction offers an alternative method for salvaging these materials. The process involves the disassembly of buildings with the intention of salvaging materials. Donated materials salvaged from deconstruction projects are eligible as a tax deduction, which can recover some of the costs of deconstruction. Deconstruction is more labor-intensive than demolition, providing opportunities for employment and workforce training. The U.S. Department of Agriculture Forest Service estimates that deconstruction creates six to eight times more jobs than traditional demolition.[123] While deconstruction can be more expensive than demolition, EPA's Office of Land and

Emergency Management (formerly the Office of Solid Waste and Emergency Response) ran a mechanized deconstruction pilot program that was cost competitive with hand demolition. This mechanized deconstruction integrated the use of equipment to dismantle and remove sections of rowhomes, reducing labor costs and onsite time.[124] The City of Baltimore also ran a deconstruction pilot program, creating 30 full-time jobs during the 18-month program where 123 houses were deconstructed, salvaging nearly 30,000 square feet of hardwood floors, more than 500,000 bricks, and over 100,000 board feet of lumber.[125]

Adaptive Reuse

Adaptive reuse is the practice of rehabilitating or renovating buildings for reuse. A common example of this is the conversion of old industrial buildings to apartments. Adaptive reuse is environmentally and socially beneficial: it reduces C&D waste by avoiding full demolition, fills vacant buildings, and can provide needed space for housing, businesses, and other uses. Data from a 2022 American Institute of Architects survey suggested that adaptive reuse is becoming more common in the industry.[126] In January 2023, New York City released its *NYC Office Adaptive Reuse Study,*[127] which provides policy recommendations for increasing the adaptive reuse of office buildings, which have been subject to a sharp rise in vacancy rates since COVID-19. In New York City, the demand for offices decreased, but demand for housing is high. The study recommended reevaluating certain zoning areas to allow for increased residential use and expanding flexibility in regulations for building conversion.

U.S. Waste Exports

Of the 292 million tons of MSW the United States produced in 2018, 62% was landfilled or sent to incineration facilities, nearly 24% was recycled, and 9% was composted. Approximately 5-6% of the waste generated in the U.S. in 2018 was organic waste managed by other means, including use in animal feed, co-digestion/anaerobic digestion, bio-based materials/biochemical processing, donation, land application, and sewer/wastewater treatment.[128] The United States produces the largest amount of plastic waste in the world, with one study[129] estimating that the U.S. generated over 42 million tons in 2016 and the EPA estimating 35.7 million tons in 2018.[130] In 2016, 3.9 million tons of plastic waste were collected for recycling, and more than half of that material was exported to other countries.[131]

The U.S. exports many types of waste to other countries, and foreign policies limiting waste imports in recent years have affected end-use markets for U.S. waste. U.S. exports of scrap plastic declined from 2.3 million tons in 2015 to around 0.6 million tons in 2021.[132] The U.S. exported around 0.45 million tons of plastic waste in 2024.[133] The decrease in exports is largely due to China's 2017 ban on plastic scrap imports and bans or restrictions set by other countries. Prior to these bans, the U.S. had shipped about a third of its recyclable waste to China. After the bans started, U.S. began sending more plastic waste to Canada, Malaysia, Vietnam, Thailand, and other Southeast Asian countries, which also saw an increase in imports from the U.K., Germany, Japan, and Australia.[134] In 2018, 78% of the U.S. plastic waste exports were sent to countries with waste "mismanagement rates" greater than 5%.[135] Waste is considered mismanaged when the material is "neither recycled nor landfilled nor incinerated".[136] The actual amount of U.S. plastic waste that ends up in countries with poor waste management may be even higher since countries like Canada and South Korea may reexport U.S. plastic waste. Tariffs imposed in 2025, for example on metal could affect domestic demand for recycled materials, affect costs and availability of a range of products, and could therefore have a variety of effects on waste management that are not yet clear.

Environmental Justice

Regionally and nationally, states are reevaluating their methodologies for identifying environmental justice (EJ) populations, as well as their programs for community outreach, assessment of equity and burdens and benefits of environmental conditions.

In April 2023, NJDEP adopted new rules that establish an EJ compliance process in the case of a new facility or the expansion or renewal of an existing facility.[137] The new EJ rules include the definitions of an overburdened community and the types of facilities subject to these rules, including major sources of air pollution, incinerators, resource recovery facilities, large sewage treatment plants, transfer stations, solid waste facilities, recycling facilities that receive at least 100 tons per day, scrap metal facilities, landfills, and medical waste incinerators. For waste facilities being sited in overburdened communities, an Environmental Justice Impact Statement is required along with meaningful public participation in which members of the overburdened community have a say in whether there is compelling public interest for the community to approve of the site.

Similarly, EPA finalized its *Environmental Justice Action Plan* in 2022. The plan, which considered environmental justice during the regulatory development process, provided information and resources for various land pollution prevention and cleanup programs with a focus on programs in overburdened communities.[138] This includes superfund, brownfield, and underground storage tank cleanup programs; emergency response solid waste management programs; and corrective actions programs under RCRA. The plan also discussed the National Recycling Strategy, which aims to increase the environmentally protective management of materials and decrease the negative environmental impacts of waste on communities with EJ concerns. The plan was followed by the EPA's 2023 Equity Action Plan[139] and the 2024 Environmental Justice Strategic Plan[140]. The 2023 Equity Action Plan aimed to improve access to federal funding and assistance in EJ communities, reduce environmental impacts on EJ communities, and ensure civil rights compliance within the agency. The 2024 Environmental Justice Strategic Plan included the following goals:

- "Promote Environmental Justice and Civil Rights at the Federal, Tribal, State, Local, and Community Levels;
- Embed Environmental Justice and External Civil Rights into the EPA's Programs, Policies, and Activities;
- Strengthen External Civil Rights Enforcement to Protect Access to a Healthy Environment for All People."

As mentioned in EPA's *Environmental Justice Action Plan*, the Infrastructure Investment and Jobs Act (IIJA, also referred to as the Bipartisan Infrastructure Law) provides $275 million in funding for EPA to create a Solid Waste Infrastructure for Recycling (SWIFR) grant program, $75 million for a new Recycling Education and Outreach grant program and Model Recycling Program toolkit, and $25 million for EPA to develop best practices for the collection of batteries and a voluntary battery labeling program. EPA anticipates that these programs will support disadvantaged communities. In 2022, EPA also awarded funds to accelerate the development of new infrastructure for anaerobic digestion of food waste or increase the capacity of existing anaerobic digestion facilities in the United States. Around half of the funding was given to projects located in environmental justice communities.[141]

Issues of global environmental justice surround the export of waste and pollution to other countries where labor is cheaper and environmental regulations are less stringent.

The Basel Convention

In the 1970s, an increasing awareness of public health and environmental impacts from the improper disposal of hazardous waste led to stricter regulation of its disposal in some countries. This increased disposal costs and led some hazardous waste handlers to increase the amount of waste exported to other countries with fewer regulations and lower disposal costs. This prompted the creation of the Basel Convention,[142] an international agreement regarding the movement of hazardous waste, in 1989. The Basel Convention promotes environmentally sound waste management by requiring countries to provide written consent to receive shipments of certain types of waste (infectious, toxic, poisonous, explosive, corrosive, etc.). In accordance with the Basel Convention, nations should not export waste to a destination that is not expected to manage that waste responsibly.

The Basel Convention set standards and provides resources for countries to manage hazardous wastes, but it is the responsibility of countries and states to establish regulatory authority and legislation to implement those standards. The U.S. signed the convention in 1990 but has not ratified its terms by codifying them in U.S. law. Effective implementation of the Basel Convention is hindered by the lack of U.S. participation, as the U.S. is one of the world's largest exporters of waste. However, the Basel Convention has affected waste management operations in the U.S., as it has encouraged a number of other countries to create policies restricting or banning imports of certain types of waste, as described in the following sections.

Operation National Sword and Basel Convention Amendments

Prior to 2017, the bulk of plastic scrap generated in the United States was shipped to China, which has historically been the world's largest importer of post-consumer materials and solid waste. Due to concerns regarding public health, waste mismanagement, and pollution, in 2013, China launched Operation Green Fence, which subjected all scrap imports to increased inspection and expanded quality requirements. Through Operation Green Fence, China limited contamination rates to a maximum of 1.5%. In 2016, China announced that there would be more stringent requirements in the following year. Operation National Sword was introduced in 2017, banning the import of 24 kinds of solid waste and reducing acceptable contamination rates to 0.5%. Banned imports include most plastic scrap, vanadium slag (a solid byproduct of iron and steel mills that can be recycled), unsorted paper, and used textile materials.[143]

Operation National Sword was a sudden shift from previous operations and heavily disrupted recycling in the U.S. Previously, various types of scrap materials could be exported to China for a profit. The National Sword policy reduced demand and prices for recyclable materials, requiring the United States to pay to export scrap materials.[144] Additionally, achieving contamination rates below 0.5% was a challenging shift for U.S. waste handlers and increased the cost of material recovery facility operations. This resulted in a 23.2% increase in plastic waste landfilled in the U.S.[145] A University of Buffalo study noted,

> "Following China's National Sword policy, the amount of plastic recycled in the U.S. has significantly declined. Meanwhile, the amount of plastic that is landfilled in the U.S has increased. This underlines the importance of improving domestic plastic recyclability, recycling rates, and reducing contamination."[146]

China has expressed the goal of zero waste imports moving forward,[147] and other countries have also implemented restrictions on scrap imports.[148] Amendments to the Basel Convention introduced in 2019 increased restrictions on the movement of plastic waste.[149] India, which imported 12.4% of U.S. plastic scrap exports in 2018, banned plastic imports in 2019,[150] though it relaxed the ban in 2022, accepting 93,000 tons of plastic waste from countries including the U.S.[151] Many other South and Southeast Asian countries—including Taiwan, Malaysia, Indonesia, Vietnam, and Thailand—have limited, banned, or plan to ban imports of scrap materials, particularly plastic.[152]

Prices for recycled materials, particularly paper, have plummeted since 2017. In 2021, recycling prices reported in 10 New England states began recovering, which the Solid Waste Association of North America attributes to increased investment in domestic material recovery facility capacity, increased exports of recovered fiber from paper recycling, and initiatives by major corporations to increase collection and recycling of plastic containers.[153]

African Textile Imports

A high percentage of used clothing is exported from the U.S. to be resold in other countries. Most of this clothing is comprised of donations. When used clothing donations are not reused or resold by U.S. nonprofits, they are baled and sent overseas to other countries.

Oxfam, a British clothing donation charity, estimates that 70% of clothes donated in Europe end up in Africa.[154] In 2015, East Africa imported around $151 million worth of used clothing. The three largest exporters were the United States, the United Kingdom, and Germany. The clothing is generally sold in bulk and vendors often adjust or re-dye the clothing for resale. While this contributes to material reuse, clothing often ends up wasted, with the burden of disposal put on countries with less developed waste management infrastructure. In a 2021 article titled “Fast fashion in the U.S. is fueling an environmental disaster in Ghana,” CBS News reported that each week, around 15 million clothing items are brought to the Kantamanto market in Ghana—a country with a total population of 30 million.[155] They estimated that 40% of the imported clothing ends up in landfills.

The East African Community (EAC) consists of seven states: the Democratic Republic of Congo, the Republic of Burundi, Kenya, Rwanda, South Sudan, Uganda, and the United Republic of Tanzania. Since 2016, the EAC has been pushing member states to phase out clothing and textile imports in favor of locally produced textiles, with a goal of a complete ban in 2019. Economic retaliation from the United States[156] and a lack of local manufacturing capacity has resulted in limited implementation of the ban. Uganda, Rwanda, and Tanzania have raised taxes on imports and have not implemented a ban.[157] Kenya dropped out of the agreement and is instead exploring options for heightened regulation of imports and increasing local processing and manufacturing of textiles.

Recycling Rates

According to EPA, the percent of MSW recycled and composted in the U.S. has increased from about 6.4% in 1960 to 32.1% in 2018, but the growth in the recycling rate slowed since 2005 (see **0**).[158] In 2018, the food composting rate was 4.1% (2.6 million tons), up from 2.2% (0.68 million tons) in 2000. A 2021 assessment of state-by-state recycling rates for common containers and packaging materials indicated that the top 10 states had rates of 44% (Iowa) to 72% (Maine), with New York in the middle at 51%.[159] The state with the lowest recycling rate for common containers and packaging materials was West Virginia at 2%. The states with the highest rates had strong recycling policies, investment in infrastructure, and recycling technologies.

Table 2. Recycling and composting as a percent of generation in the U.S.

Material	1960	1990	2000	2005	2010	2015	2018
Paper and Paperboard	17%	28%	43%	50%	63%	67%	68%
Glass	2%	20%	23%	21%	27%	28%	25%
Plastics	--	2%	6%	6%	8%	9%	9%
Yard Trimmings	--	12%	52%	62%	58%	61%	63%
Lead-Acid Batteries	--	97%	93%	96%	99%	99%	99%
Source: EPA, Advancing Sustainable Materials Management: Facts and Figures Report[81]							

Globally, Germany has the highest recycling rate of 56%, according to a 2017 report. Austria, South Korea, and Wales also achieve rates greater than 50%.[160] By the same measure, the U.S. recycling rate is 34.6%. Countries with higher rates of recycling have taken a variety of methods to restrict alternative methods for managing end-of-life plastics and other waste types. Taxes on landfilling waste, as practiced in France and the U.K., for example, or outright bans on allowing landfill disposal of certain categories of waste, are the most effective ways to limit the amount of waste sent to landfills. Taxes on incineration are also increasingly used to limit this form of waste processing. [161]

Key Points

- The U.S. is one of the largest generators of MSW. High-income countries generate the most waste globally.
- Other waste streams (industrial waste, C&D, and agricultural waste) are significant sources of waste in the U.S. and globally.
- Greenhouse gas emissions are produced by waste transportation, disposal, and incineration. Moving towards a circular economy, where waste is reduced/avoided through resource recovery, is crucial for sustainability.
- The 1976 Resource Conservation and Recovery Act (RCRA) established U.S. federal standards for the handling, treatment, and disposal of hazardous and non-hazardous waste. Since RCRA was established, the United States government, states, and municipalities have developed further waste management policies and regulations, such as recycling requirements and environmental justice policy.
- Responsible waste management is key to reducing environmental and public health impacts from waste.
- Waste disposal and incineration capacity in the United States is limited—shifting towards waste prevention, reduction, and reuse should be prioritized.
- Most landfills and incineration facilities in the U.S. are located within overburdened and marginalized communities, referred to as environmental justice communities.
- The United States and other wealthy countries export material for disposal and recycling, typically to poorer countries. These countries often do not have sufficient infrastructure capacity to responsibly manage large amounts of imported material, leading to the pollution of waterways, air, and land.
- China's National Sword policy, the Basel Convention, and similar policies that restrict international imports of post-consumer materials have major impacts on material prices and end-markets.
- Policies that require the use of recycled materials are expected to increase the value of post-consumer materials and expand end markets.
- Textile waste and electronic waste have increased significantly in recent years, and the majority of these materials are not recovered.
- Some countries, such as Germany, Austria, South Korea, and Wales have recycling rates over 50%. The United States had a recycling rate of 32% in 2018.
- Investment in recycling infrastructure, disposal bans, taxes on disposal or incineration, and extended producer responsibility laws are mechanisms for reducing waste generation and disposal.
- Waste management and material recovery technology continues to evolve and expand. Automated Material Sorting and other software is used to optimize waste handling and recycling operations.
- Composting and anaerobic digestion are used to recover organic waste material.
- Advanced thermal treatment technologies are in development and can potentially provide outlets for hard-to-recycle plastics in the future.

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New York City Draft Solid Waste Management Plan 2026

Attachment E: Organic Waste Generation and Management in New York City

This attachment to New York City *Draft Solid Waste Management Plan 2026 (Draft SWMP26)* describes the types of organic waste generated in New York City, sources and amounts of organic waste, relevant laws and programs, New York City Department of Sanitation (DSNY) and other City agency organic waste management practices (including collection, processing facilities, and recovery for beneficial use), and organic waste management challenges.[1]

1. Introduction

New York City residents produce approximately 1.5 million tons of organic waste per year, not including biosolids from wastewater treatment. Approximately one-third of residential waste consists of organics suitable for composting; however, in 2024, less than 10% of DSNY-managed organics waste were diverted.

Businesses in New York City produce between 0.7 million and 0.9 million tons of organic waste per year. The large range reflects commercial waste data gaps that may be addressed in the future through the Commercial Waste Zones Program. Specifically, some of the waste generated by New York City businesses is transferred at private transfer stations within New York City.

In total, New York City residents and businesses generated between 2.2 million and 2.4 million tons of organic waste in 2023, not including biosolids, accounting for approximately one-third of the DSNY-managed and commercial waste streams. Additionally, New York City wastewater resource recovery facilities (WRRF) produce biosolids, which are an organic byproduct of the wastewater (sewage) treatment process. In 2024, the treatment of New York City's wastewater resulted in 470,000 wet tons of biosolids.[1]

Prior to the rollout of the Citywide Residential Organics Program to all residents and schools in the fall of 2024, the portion of organic materials separated from refuse (source-separated organics, or SSO) and recovered for beneficial use was approximately 6% of organics in the DSNY-managed waste stream.[2] When organic materials are not recovered, they are sent to landfills or incinerators. The full rollout of the Citywide Residential Organics Program resulted in an average capture rate of approximately 10.5% (total for residential and school collections) from January through July 2025. This capture rate is projected to grow, as New Yorkers continue to increasingly participate in the program.

The recovery of organics can provide socioeconomic and environmental benefits by supporting hunger relief efforts, creating jobs, reducing waste disposal costs, minimizing waste that attracts pests, producing soil, wood chips, mulch, and other material that can be beneficially used. Organics recovery also results in less air pollution and lower greenhouse gas (GHG) emissions as compared incinerating and landfilling waste, thereby benefiting public health and reducing contributions to climate change. Improving organic waste management is therefore a major opportunity to further the City's and State's solid waste and other goals. However, organics recovery presents several major challenges, including contamination (improper sorting) of the organic waste stream, specific processing requirements

for different types of organic waste (e.g., wood vs. food scraps), permitting and planning, challenges with finding suitable space for organics recovery sites and infrastructure, and equitable organics management.

Both landfilling and thermal treatment emit GHGs and other air pollutants. Continued reliance on landfilling and thermal treatment of waste may become a challenge in the future, given limited existing capacity; the difficulty of siting and permitting new facilities; and concerns related to climate change, public health, and environmental justice. Moreover, the costs of transport and disposal of waste will likely continue to rise.

The expansion of organics recovery has the potential to reduce the contamination of other waste streams, thereby improving recoverability of materials such as metals, glass, and plastic (MGP). Additionally, it can lower waste management costs associated with disposing of organics.

Projections and capacity assessment developed as part of this *SWMP26* indicate the potential need for additional organics management capacity to process specific types of organics materials that would be generated within New York City toward the end of the 2026–2036 planning period.

2. Types and Quantities of Organics

Organic waste generated in New York City includes food waste; leaf and yard waste; biosolids; fats, oils, and grease (FOG); and other miscellaneous organic waste (e.g., animal manure, wildlife mortalities, wood debris from construction, and organic waste from industrial processes). This section describes each of these types of organic waste.

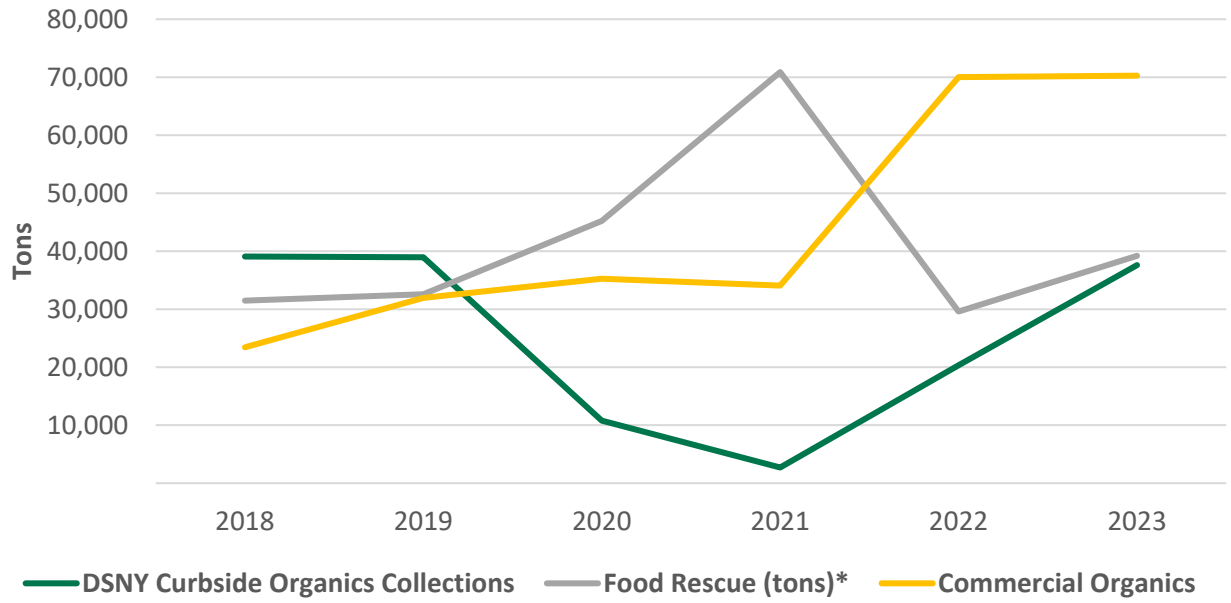
Food Waste

Food waste includes uneaten edible foods, food scraps (including meat, bones, dairy, prepared foods, fruit and vegetables, eggshells, tea leaves, and coffee grounds, as well as non-plastic tea bags), and food-soiled paper (e.g., paper napkins, greasy uncoated paper plates, compostable food storage containers, and pizza boxes).

Food waste is the largest subset of organic waste generated in New York City. Restaurants, grocery stores, and other food service establishments are the main generators of food waste in the commercial sector.[3] Since 2021, organics recovery has increased in both the residential and commercial sectors, aligning with local laws aimed at increasing beneficial use of organics. In 2023, the most recent year of available data, private transfer stations accepted approximately 70,000 tons of source-separated organics from businesses, which is assumed to be primarily food waste. That year, DSNY collected nearly 38,000 tons of organic waste, which is primarily assumed to be food waste, through the Citywide Residential Organics Program. Food rescue (donation of edible food) in 2023 and 2024 averaged over 40,000 tons.

Figure 1 provides the estimated amounts of food rescued or recycled between 2018 and 2023 in the residential and commercial sectors.

Figure 1. Food Rescue and Recycling Collected, 2018 – 2023



Note: *Food rescue is reported for fiscal years. It is assumed that most of residential organics consist of food waste as leaf and yard waste is reported separately. Residential organic amounts presented here (and tracked by DSNY) include organics collected from New York City Public Schools (NYCPS), as the school waste can be collected along the same sanitation truck routes as residential waste and SmartBins.*

Source: *Private Transfer Station Reports, DSNY Organics Data; New York City Municipal Refuse and Recycling Statistics (2018-2023).*

Leaf and Yard Waste

Leaf and yard waste includes leaves, grass clippings, garden debris, vegetative residue that is recognizable as part of a plant or vegetable, small or chipped branches, and similar plant material collected from parks, gardens, and yards. Leaf and yard waste does not include material greater than eight inches in diameter and eight feet in length.

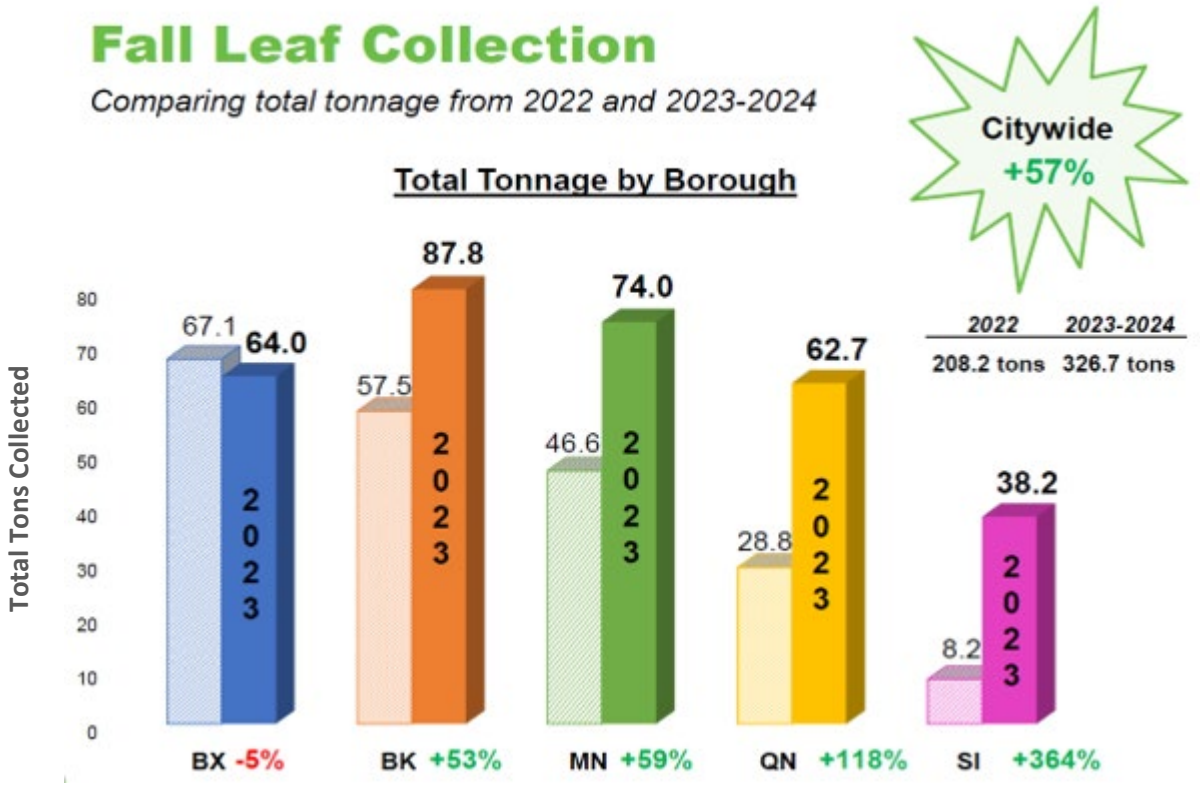
An estimated 100,000 tons of leaf and yard waste per year are produced from New York City green spaces. Private landscapers are the largest generators of leaf and yard waste in the commercial sector, generating leaf litter, tree branches and limbs, weeds, and other materials. Private landscapers provide services for both residential and commercial properties.

New York City parks generate an estimated 38,000 tons per year of leaf litter, material from tree removals, and other leaf and yard waste. The estimated amount of yard waste from New York City parks does not include grass clippings, which are left to decay in place. It also does not include organic material collected after storms, known as disaster debris. This stream is not tracked or reported by DSNY. Data provided by the Department of Parks and Recreation (Parks) showed an average of around 700 tons per year were collected by Parks from 2014-2022.[3] **Figure 2** indicates the amount of leaves that Parks composted at DSNY's Soundview Park and Staten Island Compost facilities. This includes leaves set out by Parks and collected by DSNY and leaves brought to these sites by Parks.

In 2023, DSNY managed over 5,600 tons of brush at the Staten Island Compost Facility (SICF) and around 500 tons of wood waste at SICF and Soundview Park. The amount of leaf and yard waste increases in spring and fall, with DSNY collecting the most in October.

During fall of 2023 DSNY collected 327 tons of leaf litter. Data on DSNY collected leaf litter was not available for fall 2024 at the time of the assessment for this *Draft SWMP26*. In 2023, DSNY managed around 200 tons of leaves at Soundview Park and 8,200 tons of leaves at Staten Island Compost Facility. That year, over 20,000 tons of grass clippings and brush were managed at SICF and around 500 tons of wood waste, including Christmas trees, were managed at SICF and Soundview Park. A substantial amount of this tonnage was brought to these compost sites by private landscapers. Parks mulch mows leaves on lawns and leaves them in place. Similarly, leaves and other organic materials in horticulture beds are left in place to decompose, providing nutrients to the soil.

Figure 2. Fall Leaf Collection by Borough, 2022-2024 Fall Leaf Season



Source: *NYC Department of Parks and Recreation.*

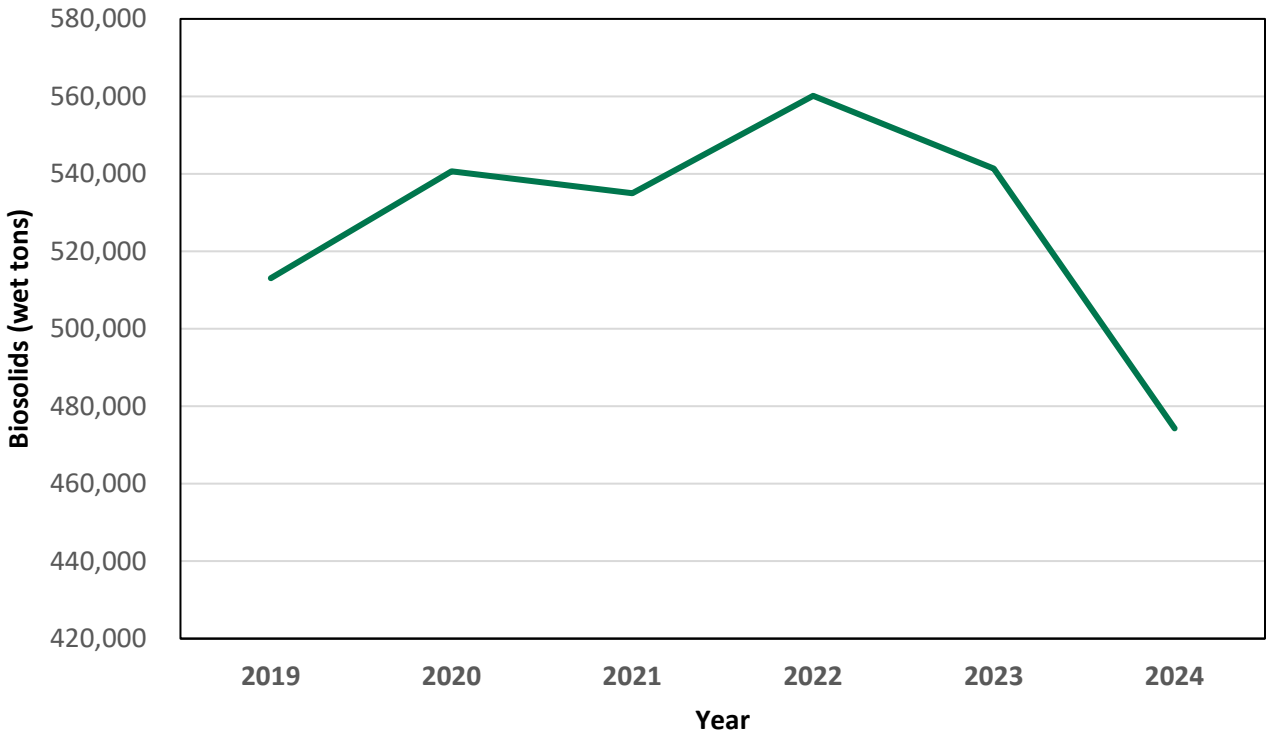
Biosolids and Other WRRF Byproducts

Biosolids are organic byproducts of the wastewater treatment process. In addition to treated wastewater, the wastewater treatment process produces sewage sludge, scum, grit, and screenings.

- *Sewage sludge* is composed of heavier organic materials that settle at the bottom of the sedimentation tanks at Wastewater Resource Recovery Facilities (WRRFs). Sludge is dewatered to produce *dewatered cake* or dehydrated sewage sludge and further treated to produce biosolids. Biosolids that meet regulatory requirements can be beneficially used as fertilizer, compost, soil amendment, or landfill cover. Biosolids from wastewater treatment in New York City that are not beneficially used (as defined by the New York State Department of Environmental Conservation [DEC]) are used as landfill cover, which is considered a productive use. While biosolids can be incinerated in general, New York City does not send its biosolids for incineration.
- *Scum* is composed of lighter organic materials, such as grease and oils, that float to the top of sedimentation tanks. New York City Department of Environmental Protection (DEP), as the operator of the City's WRRFs, has been exploring scum management using anaerobic digestion.
- *Grit*, which includes materials like sand and gravel, and *screenings*, which include objects such as rags, paper, plastics, and metals, are removed from untreated sewage before further processing. These wastewater treatment byproducts are generally not suitable for recovery and are sent to landfills for disposal.

The wastewater treatment process also produces biogas, which is mostly methane. This gas can be refined for use as fuel for heating and other purposes. In 2024, DEP processed almost 870,000 wet tons of organic material. This organic material included approximately 68,000 wet tons of food scraps and 792,000 wet tons of sludge and resulted in 474,281 wet tons of biosolids. Additionally, DEP managed over 80,600 cubic yards of inorganic materials (grit and screenings) and 7,600 cubic yards of scum. **Figure 3** shows the estimated amount of biosolids produced from New York City wastewater treatment.

Figure 3. Biosolids Produced, 2019 – 2024



Source: *2023–2024 Biosolids Data Provided by DEP*

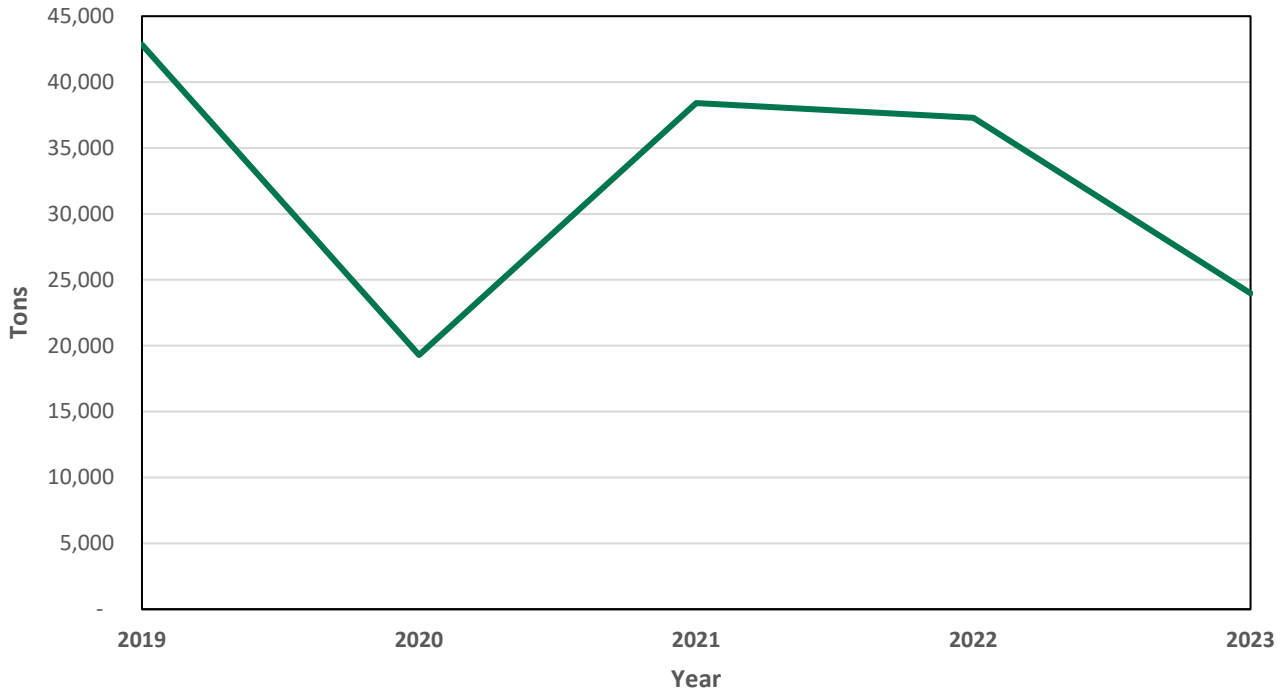
Note: *Some fluctuations in tonnage data are attributed to changes in methodology and improved processing.*

Fats, Oils, and Grease

Fats, oils, and grease (FOG) can be categorized as yellow grease and brown grease. Yellow grease is collected from fryers and griddles in commercial settings and is considered clean grease. Brown grease is recovered from grease traps and interceptors. Brown grease can contain food scraps and other solid materials. The primary generators of FOG are restaurants and other food service establishments.[4]

- According to annual reports to DEC, New York City facilities that process and transfer used cooking oil and grease accepted an average of around 32,000 tons of FOG per year from 2019–2023. In 2020, the quantity of FOG sharply decreased, as depicted in **Figure 4**. This is likely a result of restaurant closures and reduced economic activity due to the Covid-19 pandemic.
- Private carters in New York City complete voluntary surveys regarding the quantities and types of material they haul. These surveys are not comprehensive and may also include material hauled directly out of the city. In 2022, carters reported transporting over 90,000 tons of oil and grease. Thirty-eight percent of this tonnage was non-recyclable brown grease, and 62% was recyclable yellow cooking oil.[5] An internal study conducted by DSNY estimated that around 120,000 tons of FOG are generated in New York City each year.

Figure 4. FOG Collections Reported, 2019-2022



Source: *Oil Processor Annual Reports to DEC, 2019-2023*

Other Organic Materials

Other organic waste materials include animal byproducts, residue from paper recycling, manure, waste lumber, and animal and human mortalities. **Table 1** estimates other organic materials based on data from 2016 through 2022.

- *Animal byproducts* are animal fats, bones, seafood shells, and other material generated at butcher shops and similar small-scale commercial establishments.
- *Industrial organic waste* includes paper pulp and inedible material from food and beverage processing.
- *Manure* includes waste generated by working animals (e.g., New York City Police Department horses and dogs), zoo animals, and aquarium animals.
- *Waste lumber* includes treated and untreated construction and demolition wood.
- *Wildlife mortalities* include dead wildlife found on public property.

Table 1. Average Generation of Other Organic Material in New York City

Material	Quantity (Tons Per Year)
Paper pulp*	107,000
Manure (zoos and aquariums)	15,000 – 20,000
Manure (horses)	2,500
Waste lumber	800,000
Wildlife mortalities	40
Source: DSNY, research for the Citywide Organics Study.[1] **Note:** All quantities are estimates, with the exception of paper pulp, which was provided by the paper recycling processor (the reported value is an average of 2016 to 2022 data). *Paper pulp is an intermediary product in the paper recycling process. Although paper pulp is an organic material, it is considered recyclable by DSNY; therefore, it is not addressed more extensively in this attachment.	

Gaps in Organics Data

Data on organics treated at WRRFs is more complete and easier to track than other organics waste, as DEP manages and collects information on all of the wastewater treatment byproducts. The amounts of other organic waste are more challenging to quantify because other organic waste is generated by both the residential and commercial sectors and managed by City agencies, nonprofits, and the private sector, with some overlap (e.g., some residential organics are managed at private transfer stations, and private landscapers can use DSNY's Staten Island Compost Facility). In addition, information on material flows and destinations is not comprehensive or not available for many of the organic waste streams as current policies do not require reporting of waste generated or collected for all waste streams. For many organic materials, data is not collected systematically or reported consistently by private waste haulers through the DSNY Private Carter Surveys. Therefore, there are the following data gaps for organic material waste streams generated in New York City:

› The quantity of mulch produced from wood chipping in New York City (data not available)

- The quantity of waste lumber from construction and demolition (C&D) waste (data not comprehensive)
- The quantity of organic material processed at community composting sites (data not comprehensive)
- The amount of animal feed waste and animal mortality material generated at zoos and stables (data not available)
- Quantities of animal fat and byproducts generated in New York City (data not available)
- Food recovered through donations (data not comprehensive)

The material flow of waste lumber from C&D waste is largely undocumented. The quantities and destinations are reported by private waste haulers account for a small portion of the estimated 318,000 tons per year of C&D waste lumber. This figure is based on the total quantity of C&D debris reported as received by private transfer stations (over 2 million tons in 2023) and an estimate of 15% wood in the C&D debris waste, based on DEC's 2010 *Beyond Waste*[6] Solid Waste Management Plan and the 2023 *New York State Solid Waste Management Plan: Building the Circular Economy Through Sustainable Materials Management (2023 - 2032)*.[7]

The destination of most of the animal manure collected in the city is unknown. Approximately 600 of an estimated 2,500 tons of horse and zoo animal manure are sent to Staten Island Compost Facility.

Other than paper pulp, information on the amount and type of industrial organic waste, as well as the management and beneficial reuse opportunities for such waste, is not collected. Industrial activity in New York City is limited. Large industries within New York City, other than DEP's WRRFs and a paper recycling facility, are energy production facilities that do not generate solid organic waste. Smaller production facilities, such as bakeries, microbreweries, and coffee roasters within New York City, are generally commercial-scale businesses.

An estimated 53% of leaf and yard waste is privately managed at facilities not managed by DSNY, and the information about the destination of that material is not collected.

Some end sites for organics collected from the commercial sector and managed at private transfer stations are not documented.

3. Sources of Organic Waste

In New York City, there are two overarching organic waste generators: the public sector and the commercial and industrial sectors. The public sector consists of residents and agencies, including the New York City Housing Authority (NYCHA) and New York City Public Schools (NYCPS). Within the commercial and industrial sectors, primary generators of organic waste include restaurants, grocers, packaged food manufacturers, and other food-service businesses.

Public Sector

Annually, over 1 million tons of organic waste, including food scraps and leaf and yard waste, are generated by New York City residents, schools, and agencies.[1,8]

In 2023, DSNY managed over 72,000 tons of organic waste from curbside collections and accepted at composting sites owned or supported by DSNY. DSNY collected 37,590 tons of source-separated organics as part of the curbside collection program. DSNY also managed over 30,000 tons of organics at SICF, 3,200 tons at the Rikers Island composting site, and 400 tons at Soundview Park. An additional 1,600 tons were managed at other compost sites

and reported to DSNY.[9] Additionally, 39,200 tons of edible food were donated through donateNYC and diverted from the waste stream in Fiscal Year 2023 (FY23).[10]

Residential

The *2023 Waste Characterization Study* determined that in 2023, the largest portion of organic material discarded by residents was food scraps (21.1%), followed by food soiled paper, yard waste, and compostable packaging (see **Figure 5**). The *2023 Waste Characterization Study* sampled organics from Queens, as part of the initial DSNY Citywide Residential Organics Program rollout, as well as certain legacy opt-in districts. Legacy opt-in districts are those that were, prior to the rollout of Citywide Residential Organics Program, eligible to request composting services from DSNY.[8]

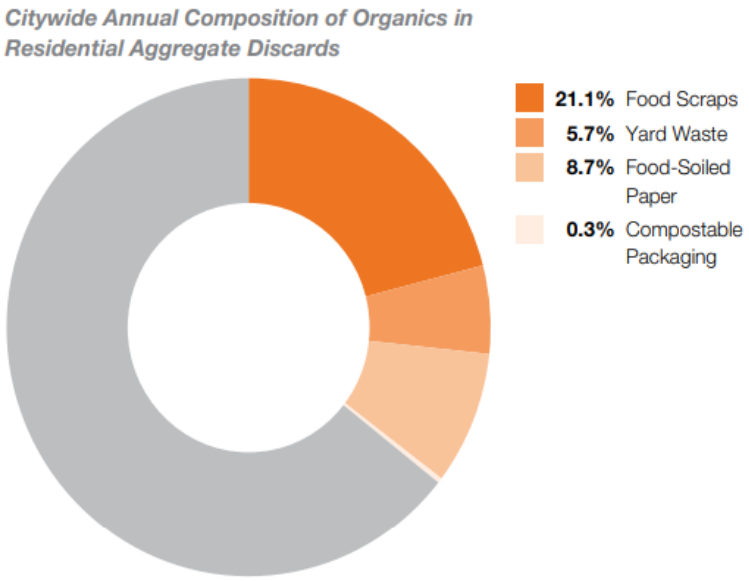
In **Figure 5** and the *2023 Waste Characterization Study*, the term "aggregate discards" refers to the sum of all material streams for each generator. For example, residential aggregate discards are the sum of refuse, MGP (metal, glass, and plastic), paper, and organics for all residential waste.

Figure 5. Waste Characterization Results: Residential Organics

Percentage of Organics in Residential Aggregate Discards Over Time	
2005	28.0%
2013	31.5%
2017	34.4%
2023	35.8%

Although organics has increased as a percentage of all discards, it has decreased on a per household amount in refuse.

Organics in Residential Aggregate Discards Per Household Over Time, Lb/HH	
2005	638.2
2013	630.1
2017	683.2
2023	679.6



Source: *DSNY, 2023 NYC Waste Characterization Study.*[8]

Organics accounted for 35.8% of residential aggregate discards in 2023. This value has increased over the past 20 years, from 28.0% in 2005 to 31.5% in 2013 and 34.4% in 2017 (see **Table 2**). The *2023 Waste Characterization Study* found that 679.6 pounds of compostable organics per household were generated in 2023, based on residential

aggregate discards that year. This value has generally increased over time, albeit with some fluctuations, as shown in **Figure 1**. Organic waste generated per household in 2023 represents a drop from 2017 but an increase since 2005.[7]

Table 2. Organics in Residential Waste Stream

Year	2005	2013	2017	2023
Organics Suitable for Composting*	**28.0%**	**31.5%**	**34.4%**	**35.8%**
Food Scraps	17.7%	18.0%	20.7%	21.1%
Food-Soiled Paper	6.1%	7.5%	8.1%	9.0%
Yard Waste	4.2%	6.1%	5.5%	5.7%

Note: *The percentages in this row represent the portion of the total residential waste that is organic and suitable for composting. The rows below further categorize and quantify that organic waste.
Source: DSNY, *2023 NYC Waste Characterization Study*[8]

New York City Public Schools

In 2023, almost half of aggregate waste discarded at schools in New York City was organic waste suitable for composting, representing a slight drop from 2017.[2] However, the high percentage of organics in the school waste stream presented an opportunity for expanding diversion. In 2024, organics collection became available to all public schools.

The composition of organic waste from school aggregate waste discards in 2017 and 2023 is summarized in **Table 3.** Of the organic waste generated by schools in 2023, more than 65% was food scraps.[8, 11]

Table 3. New York City Public School Organic Waste

Year	2017	2023
Organics Suitable for Composting*	**51.3%**	**49.1%**
Food Scraps	29.1%	32.2%
Food-Soiled Paper	20.4%	15.2%
Yard Waste	1.9%	1.7%

Note: *The percentages in this row represent the portion of the total waste from New York City schools that is organic and suitable for composting. The rows below further categorize and quantify that organic waste.
Source: DSNY- *2017 NYC Residential, School, and NYCHA Waste Characterization Study*[11]*11* and *2023 Waste Characterization Study*[8][11]

New York City Housing Authority

In 2023, approximately one third of NYCHA refuse was comprised of organics suitable for composting, similar to the fraction of compostable organics generated through other residential curbside and containerized collection. The portion of NYCHA waste suitable for composting in 2023 increased slightly from 2017. The composition of the NYCHA's organic waste suitable for composting is summarized in **Table 6**. Approximately 58% of the organics waste generated by NYCHA in 2023 was food scraps.

Table 6. Composition of NYCHA Organic Waste

Year	2017	2023
All Organics Suitable for Composting	**32.0%**	**34.6%**
Food Scraps	22.6%	20.1%
Food-Soiled Paper	7.0%	13.3%
Yard Waste	2.4%	1.2%
Source: DSNY- *2017 NYC Residential, School, and NYCHA Waste Characterization Study*[11] and *2023 Waste Characterization Study*[8]		

Commercial

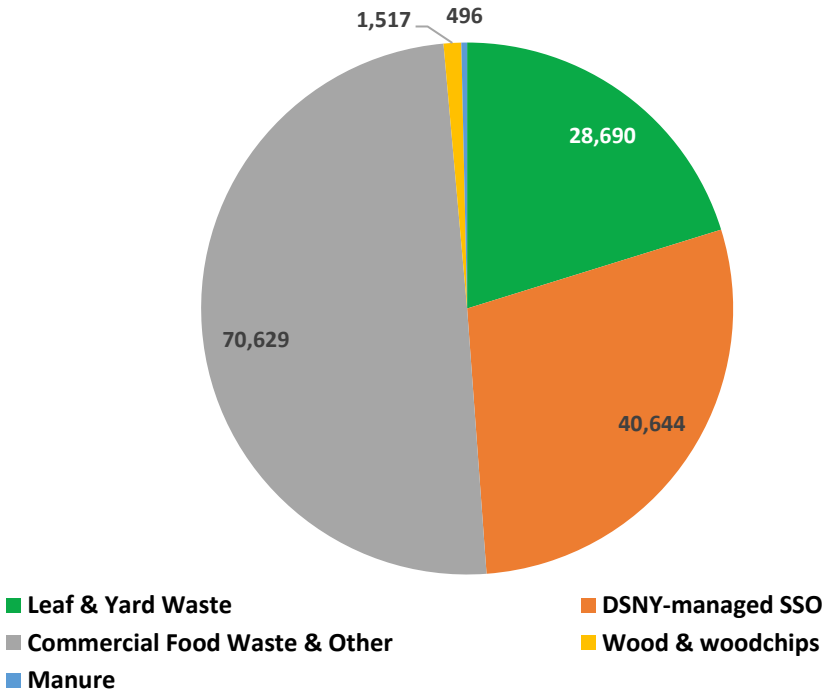
The most recent comprehensive commercial waste characterization study was conducted in 2012. In that year, approximately 34% of waste was attributed to organics. Based on this waste characterization and commercial waste data, businesses in New York City produce around 0.7 to 0.9 million tons of organic waste per year.

Much of the waste generated by New York City businesses is transferred at private transfer stations within New York City. In 2023, transfer stations accepted over 2.2 million tons of waste. Based on the *2012 Waste Characterization Study*, over 0.7 million tons of this material were organic waste.

A large amount of waste generated by New York City businesses is hauled directly out of the city without first being brought to a transfer station within the city. The amount of refuse (and organic material thrown out with refuse) that is hauled directly outside of the city is not systematically tracked, but DSNY estimates based on private carter surveys indicate that approximately 20 to 30% of commercially generated refuse is directly hauled out of the city. Using the upper end of this estimate, nearly 2.8 million tons of commercial waste were generated in 2023, and around 0.9 million tons of this material were organic waste.

Figure 6 shows the organic materials recovered by source in calendar year 2023, not including biosolids or FOG. The organic materials recovered are a fraction of the amount generated in New York City. In 2023, New York City's WRRFs produced over 440,000 wet tons of biosolids. Additionally, based on annual reports to DEC, 24,000 tons of FOG (around 200,000 gallons) were processed at New York City oil processing facilities in 2023.

Figure 6. *Organic Materials Diverted for Beneficial Use, Calendar Year 2023*



Source: *Private transfer station data, DSNY organics data*

Notes:

1. "Commercial Food Waste and other" includes food waste and other source-separated organics.
2. Leaf and yard waste are generated by residents and private landscapers and managed at DSNY-owned composting sites.
3. DSNY-managed source-separated organics (SSO) include food waste and yard waste collected by DSNY.
4. Rescued food donations are not included.

4. Past and Present Organics Management Programs

New York City and New York State requirements for organics management vary by generator and scale. Additionally, DSNY programming relating to organics management in New York City prior to the roll out of the Citywide Residential Organics Program consisted of opt-in opportunities beginning in 2013. Residential organics have been managed informally and by nonprofits in the City for decades, relying on volunteers who over time laid the groundwork for organics recovery advocacy and management.

Prior to the implementation of the Citywide Residential Organics Program, most residents disposed of food scraps and yard waste together with the refuse that is landfilled or incinerated. Historically, food scrap drop-off (FSDO) sites, community composting, and in-residence composting have been voluntary alternatives to landfilling or incinerating organics set out for collection as refuse for residents in New York City.

Recent Residential and Other Publicly Managed Organics Programs

Opt-in Organics Program

In August of 2021, DSNY offered 6.3 million residents within 44 of the city's 59 Community Districts the opportunity to participate in an Opt-in Organics Program. The Opt-in Organics Program required a minimum density of participants in each Community Board to maximize operational efficiency. Seven of the 44 Community Boards met the minimum number of sign-ups required and received curbside organic pickup services. The seven Community Boards included Brooklyn Community Boards 1, 2, 6, and 7; Bronx Community Board 8; and Manhattan Community Boards 6 and 7.

Of the households that initially signed up for the program, 29,380 households (42%) were eligible to join. Residential buildings with more than 10 units required an agreement from an authorized building representative to manage organics material. The other 58% of households were not eligible for the program because they did not secure the required agreement. By January 2023, however, an additional 127,817 households were added to the Opt-in Organics Program collection routes for a total of 157,197 households. Through this program DSNY collected 4,531 tons of organics between August 2021 and February 2023.[12]

Queens Organics Program

Curbside organics collection for all residents in Queens (2.5 million people) started in October of 2022. This program diverted 12.7 million pounds (6,350 tons) of organic material in its first season (October-December 2022). Of that amount, 3.5 million pounds of organic materials were diverted by the program in only two weeks, during the peak autumn leaf season. The program in October of 2022 was more cost-effective than the Opt-in Organics Program, at about a third of the cost per district.[13] DSNY paused the Queens Organics Program between the end of December 2022 and the end of March 2023. Queens was the first borough with universal residential collection.

New York City Compost Project

The New York City Compost Project (NYCCP) was organized by DSNY in 1993, and the program ceased operations in 2025. NYCCP was a collaboration between organizations, community groups, and the City that educated New Yorkers about sustainable organics management via hands-on demonstrations and training. NYCCP organizations also provided FSDOs. Residential organic waste collected through FSDOs was composted at Earth Matter Compost Learning Center (Governor's Island), Queens Botanical Garden Farm and Compost Site, Queensbridge Compost Site, Brooklyn Salt Lot, and numerous smaller sites.

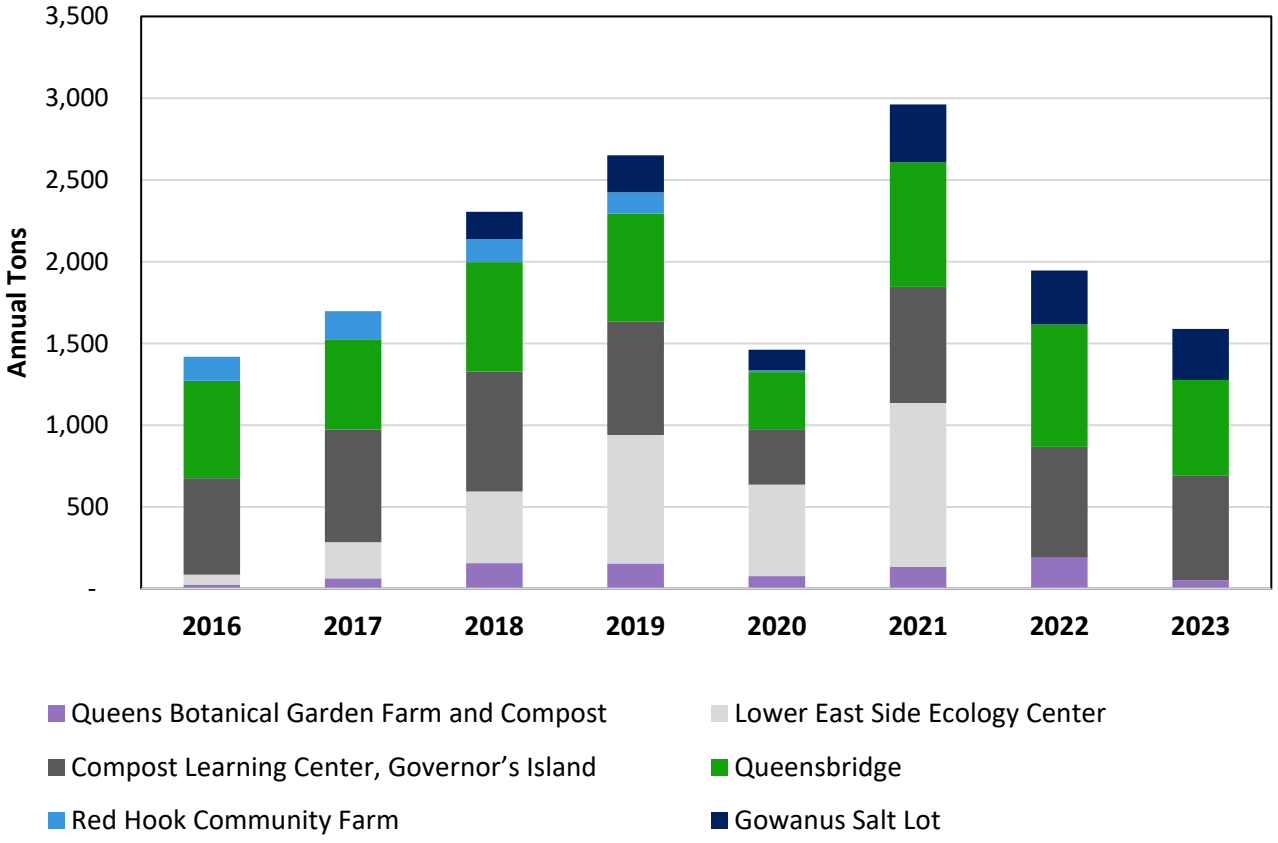
There were 225 compost sites affiliated with the NYCCP in FY14.[14] This included smaller sites, such as community gardens, parks, educational institutions, religious institutions, nonprofit organizations, residential developments, and small businesses. The amounts of organic material collected in FY24 at individual FSDO locations and the sites where the material was processed are available from the *2024 Zero Waste Report*. Each of the FSDO locations accepted smaller amounts of organics from under 100 pounds up to 145,000 pounds (72.5 tons).[2]

In 2022, close to 2,000 tons of organics collected at FSDOs were composted at community compost sites, with an additional 1,520 tons collected or processed by DSNY. Additional organic material was collected at FSDOs that are not funded by DSNY, but the amounts are not comprehensively reported.

Community compost sites continue to receive funding from City Council rather than through NYCCP funding. DSNY also continues to provide technical support to community composting efforts.

Figure 7 shows the quantity of material processed at various NYCCP sites over time.

Figure 7. NYCCP Organics Tonnage, 2016-2023



Source: *DSNY Data, Summary of Primary Program Tonnages Operated or Facilitated by DSNY, FY21-FY23.*

On-Going Residential and Other Publicly Managed Organics Programs

Citywide Organics Program and Residential Organic Waste Local Laws

With the implementation of the Citywide Residential Organics Program, DSNY aims to divert 30% of DNSY-managed organics. Organics diversion in New York City began with voluntary curbside organics collections and FSDOs. In 2023, New York City passed Local Law 85 (LL85) after the success of the Queens Organics Program and prior opt-in and pilot programs. LL85 mandated that DSNY establish a citywide organics program for all residents by October 2024. The roll-out of the program began with Queens, followed by Brooklyn in 2023, and the Bronx, Manhattan, and Staten Island in 2024, with 2025 being the first full year of the program's implementation citywide. The Citywide Residential Organics Program requires residents to separate organics from refuse and recycling.

With the implementation of the Citywide Residential Organics Program, DSNY aims to increase the amount of organics diverted from landfills. Prior to the roll-out of the Citywide Residential Organics Program, DSNY's curbside collections captured 20,330 tons of residential organics and leaf and yard waste in 2022. The initial rollout of the Citywide Residential Organics Program in Queens resulted in an increase to 37,590 tons in 2023.[15, 16] The program is anticipated to continue to grow over the 2026–2036 SWMP period.

Smart Bins

In addition to the curbside Citywide Residential Organics Program, DSNY installed approximately 400 Smart Bins throughout the city as of 2024. The Smart Bins are accessible 24 hours a day, seven days a week, using a free phone app. In FY24, 154,355 unique users accessed Smart Bins for over 1.2 million bins unlocked (i.e., unique uses of the bins).[2] Food scraps, plant waste, and food-soiled paper are allowed in the Smart Bins. Meat, bones, and dairy, which are not accepted at most FSDOs, may also be discarded in Smart Bins.

The installation of Smart Bins across the city followed the initial installation of 16 Smart Bins in Astoria, Queens, in 2021, as part of a successful pilot program.

Compost Giveback Programs

Compost Giveback programs organized by DSNY allow all New York City residents to receive New York-made compost through Compost Giveback events. Some events provide small (1-pound bag) givebacks, and DSNY operates a seasonal giveback program of 40-pound bags at multiple locations across the 5 boroughs. Registration is required to pick up from these sites and the registration form is available on the DSNY website. City agencies and nonprofit organizations, including community gardens, can schedule an appointment with DSNY for the pickup of large quantities of compost.[17]

Salvaged Wood

Parks has partnered with a private vendor to embark on a wood salvaging pilot project for New York City parks.[18] This project supports forester evaluation of trees to be salvaged and used for furniture and construction projects. Typically, trees are used to make mulch.[12] Much of the leaf and yard waste generated in New York City parks is handled by private landscapers, and the destination for the waste is not reported.[3]

Community and Nonprofit Organization Programs

- The High L. Carey Battery Park City Authority (BPCA) was established in 1968 as a public benefit corporation to operate a designated 92-acre site in lower Manhattan known as Battery Park City. Battery Park City includes 36 acres that are used as parks and public spaces, with the remainder of the area occupied by residential and commercial uses. BPCA launched a neighborhood composting program in 2019 at Gateway Plaza, the largest residential complex within Battery Park City. The resulting compost is used for gardening within Battery Park City. BPCA also offers public FSDO services. BPCA collected 35,000 pounds of organic waste (food and plant waste) in 2019, an increase from 2018 when it collected 20,000 pounds.[19]
- The Hudson River Park Trust was created as a partnership between New York City and New York State to operate a four-mile-long public corridor along the Hudson River from central to southern Manhattan. Between 2018 and August 2025, Hudson River Park collected over 648,900 pounds of community-generated organic waste at 10 drop-off locations in the park.[20] The resulting compost is returned to plant beds in the park.[21]

New York State Programs

The New York State Association for Reduction, Reuse, and Recycling organizes the annual New York State Compost Awareness Week in May. The program highlights educational events and FSDOs throughout the state. New York State Compost Awareness Week aligns with International Compost Awareness Week.[22]

DEC administers a Municipal Food Scraps Recycling Grant Program (available to municipalities)[23] and funding for local emergency food relief equipment (available to nonprofits that provide emergency food relief in New York State).[24] DEC also supports Green Schools by providing educational resources on composting, conservation, recycling, and environmental justice for teachers and organizing awards, events, and grant opportunities.[25] Furthermore, the Rethink Food Waste NY was initiated by DEC to provide free technical assistance for organic waste management for food-related businesses, composting facilities, municipalities, food relief organizations, and others in New York.[26]

Commercial Programs

Commercial Waste Zones

New York City is in the process of rolling out the Commercial Waste Zones Program. Under this program, 20 geographic commercial waste collection zones were identified for the city's five boroughs. The first—the Queens Central Zone, which includes the neighborhoods of Jackson Heights, Corona, Elmhurst, and parts of Forest Hills and Ridgewood—was fully implemented on January 2, 2025. As of April 23, 2025, the City has reported that none of the 11,000 businesses in the Queens Central Zone have submitted complaints concerning the service or billing process provided by their new selected carter.

The Commercial Waste Zones Program aims to improve both recycling and organics diversion. Carters awarded the opportunity to contract in a given zone are required to provide refuse, recycling, and organics collection. Additional information on the Commercial Waste Zones program is available in **Attachment F: Commercial Waste in New York City**.

Food Rescue

Commercial businesses can also participate in reducing organic waste generation by participating in food rescue programs. DSNY-operated donateNYC supports food rescue, connecting businesses with nonprofit organizations to reduce food waste. In FY24, 43,000 tons of food were rescued through donateNYC and partners. This does not cover all food rescued by businesses and may include organizations that aren't businesses.[27]

5. New York City Local and State Laws and Policy

Since 2016, local laws have led to the expansion of recycling or recovery of organics generated in New York City in both the public and commercial sphere. This section provides an overview of city and state laws and plans that continue to shape the management of organic waste in New York City. Additional information on organics recovery is available in **Attachment A: Local Laws Relevant to Waste Management.**

Relevant Residential and Institutional Local Laws

New York City's local laws impact five of overarching categories: food waste prevention and reduction plans, residential and institutional curbside collection and drop-off, residential organics collection requirements, facilities and management, and diversion reporting.

Food Waste Prevention and Reduction Plans

New York City established a series of local laws requiring City agencies and offices to develop policies that reduce hunger, reduce food waste, prevent food waste, or donate surplus food between 2020 and 2021. These include Local Laws (LL) 40 and 41 of 2020 and 57 and 65 of 2021.

DSNY is participating in a 10-year plan led by the Mayor's Office of Food Policy to reduce hunger, promote access to nutritional food, improve urban agriculture and food/farm economies, and reduce food waste. [28, 29, 30, 31, 32, 33]

Residential and Institutional Curbside Organics Collection and Drop-Off

Beginning in 2010, New York City local laws began establishing requirements for organics drop-off sites and collection programs. LL37 of 2010 and LL89 of 2023 both require the establishment of sites that accept organic materials.

In 2013, New York City passed LL77 establishing a voluntary curbside organics collection pilot program and school organics collection pilot program. Residential and institutional curbside organics collections expanded with the passage of LL22 of 2019. The Citywide Residential Organics Program was established with the passage of LL85 of 2023, which mandated residential curbside organics collections available to all residents. [34, 35, 36, 37]

Residential Organics Collection Requirements

Since the implementation of curbside organics collections, local laws to improve the collection process have expanded. This set of local laws impacts collection requirements, including set-out times, commingling of organics waste streams, and use of bins and bag liners. Included in this category are LL85, LL19 of 1989 and LL40 of 2010.

LL85 supplemented prior rules (LL19 of 1989 and LL40 of 2010) that mandated the separation of yard waste, thereby expanding source separation mandates to all organics.[37] DSNY developed the implementation strategy for the Citywide Residential Organics Program and set the program rollout schedule for each borough to receive weekly curbside organics collection.[38] DSNY allows residents to comingle yard waste with other organic waste.

Revisions to the Source Separation of Yard Waste and Commingling of Organic Waste Rule, which went into effect on October 21, 2023, allows yard waste collected separately from food scraps and food soiled paper to be disposed in clear plastic bags or paper bags. In an exception to this rule, paper or clear plastic bags can be used to line compost bins.[39]

Facilities and Management

LL118 of 2024 requires the establishment of five additional composting facilities in parks in each borough by 2028.[40]

Diversion and Reporting

LL86 and LL87 of 2023 relate to establishing a goal of diverting citywide-generated recyclable waste by 2030 from landfills or incinerators, and reporting on annual diversion statistics. The first of these reports is the *2024 Zero Waste Report*.

Relevant Commercial Local Laws

New York City has established local laws to improve commercial organics waste management. These laws impact certain businesses generating different types of organic waste, including food scraps, FOG, and leaf and yard waste.

LL146 of 2013[41] established commercial organic waste handling requirements for large establishments that serve or distribute food, including distributors, retailers, restaurants, arenas, and hotels. It also allowed the DSNY Commissioner to set organic waste diversion requirements for some or all establishments. The law went into effect in 2015 and was updated in 2020.

Facilities and Management

LL199 of 2019 mandates the establishment of commercial waste zones. Stemming from this law, the Commercial Waste Zones Program aims to reduce truck traffic and improve the safety of commercial waste collections in New York City through the implementation of 20 collection zones.

LL152 of 2018, known as the Waste Equity Law, reduced the maximum amount of waste that private transfer stations in the four overburdened Community Districts (Community Districts Bronx 1 and 2, Brooklyn 1, and Queens 12) can manage. The law allowed facilities to request a one-time permit increase of up to 20% to accommodate future growth in capacity for processing source-separated organic waste or recyclable materials.

Food Donation

LL176 of 2017[42] required the creation of a web portal to facilitate food donations from commercial food producers to recipients. The law went into effect in 2017 with the portal required to launch within 18 months of enactment. In alignment with this law, DSNY developed the donateNYC web portal. The web portal serves as a resource for businesses and donation recipients.

Food Waste

LL146 requires some commercial establishments to separate organic waste. The law covers food services, retail food stores, food preparation locations, catering establishments, temporary public events, arenas and stadiums, food manufacturers, and food wholesalers. The minimum business size that triggers the requirements for each establishment type is summarized in **Table 5**. The businesses covered by LL146 must separate food scraps, food-soiled paper, and certified compostable products from refuse.[41]

Table 5. Commercial Business Size Designations for Organics Separation

Establishment Type	First Designation July 19, 2016	Second Designation August 15, 2018	Third Designation July 31, 2020
Arenas and stadiums	Seating capacity of 15,000 individuals		
Food Service Establishments within a Hotel	At least 150 or more hotel rooms		At least 100 or more hotel rooms
Chain Food Service Establishments		At least 100 NYC locations	At least two NYC locations with a combined floor area minimum of 8,000 square feet
All Food Service Establishments		Floor area minimum 15,000 square feet	Floor area minimum 7,000 square feet OR Combined floor area minimum of 8,000 square feet with other food service establishments in the same building or location
Food Manufacturers	Floor area minimum of 25,000 square foot		
Food Preparation Locations			Floor area minimum of 6,000 square feet
Food Wholesalers	Floor area minimum of 20,000 square feet		
Chain Retail Food Stores			At least three NYC locations with a combined floor area minimum of 10,000 square feet
All Retail Food Stores		Floor area minimum of 25,000 square feet	Floor area minimum of 10,000 square feet
Catering Establishments			Events that host over 100 individuals
Temporary Public Events			Events that host over 500 individuals

Source: DSNY, Commercial Organics Requirements[43]

Prior to the implementation of LL146, each commercial vendor could choose how to manage food scraps and other organic material by disposing as refuse, using on-site processing methods such as on-site composting, or using a composting vendor.

Under LL146, businesses may arrange for waste collection through a private carter licensed by the Business Integrity Commission (BIC), self-transport organic waste to either an organic waste processor or a transfer station, or process organic waste on-site via in-vessel composting or other DSNY approved in-house processing methods. Food waste may not, however, be discharged into sewers.

While the use of commercial food waste disposers has been an ongoing topic of interest for decades, a 2008 DEP study found that the implementation of this technology would bring several benefits, including optimized rates of food waste diversion and truck reductions. However, the study also identified adverse effects, such as higher rates of

water consumption, sewer clogging and overflow, unequipped WWRFs, nitrogen loading, FOG contamination, and high costs, which suggested that the City was not well equipped at that time to handle this method of commercial organics waste management.[44] Therefore, commercial food waste disposers are banned in New York City, although permissible for residents.

As of July 30, 2023, food-related businesses are also no longer allowed to set out putrescible waste (including organics) using bags and must instead use secure receptacles with tightly fitted lids that are regularly maintained. This does not apply to off-street collection, such as collection from loading docks. Businesses that do set out their waste may not do so before 8 p.m..[45]

Fats, Oils, and Grease

Businesses that use and dispose of FOG are required to install grease interceptors or automatic grease removal devices in any drainage systems that are likely to receive fat, oil, and/or grease to prevent sewage build up according to best management practices. Rules of the City of New York establish requirements for grease interceptors and grease removal devices. Exemptions to this requirement include sinks and drains that are exposed to minimal FOG as specified in the rules. Grease inceptors and grease removal devices must be installed by a New York City Licensed Master Plumber.[46]

Leaf and Yard Waste

Commercial landscaping companies are not permitted to use curbside collection, nor are they permitted to disperse their leaf and yard waste on the curb, street, or on neighboring lots. They must instead use a permitted composting facility to dispose of all leaf and yard waste collected. Grass clippings are allowed to remain where they are cut. To use a composting facility managed by DSNY, commercial landscapers are required to have a valid BIC license, as well as a permit for plant waste disposal.[47]

New York City Climate Policy, as Related to Waste Management

New York City has been a leader on climate policy for almost two decades and has published the following major long-term comprehensive plans for a sustainable and resilient New York City:

- *PlaNYC: A Greener, Greater New York* (2007)[48]
- *PlaNYC: A Greener, Greater New York, Update (2011)*[49]
- *OneNYC* (2015)[50]
- *OneNYC 2050, Building a Strong and Fair City (2019)* [51]
- *PlaNYC: Getting Sustainability Done* (2023) [52]

These plans include GHG emissions reduction goals, many specific initiatives that can result in emission reductions, and initiatives aimed at adapting to future climate change impacts. The goal to reduce citywide GHG emissions to 30 percent below 2005 levels by 2030 (“30 by 30”) was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the “GHG reduction goal”). The City has also announced a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050 (“80 by 50”), which was codified by Local Law 66 of 2014. New York City aims to achieve carbon neutrality by 2050.

Waste accounts for approximately 4% of the City’s GHG emissions[53] and *PlaNYC: Getting Sustainability Done* incorporates the following initiatives related to avoiding and managing organics waste:

› Promote reduction in institutional food-related emissions by 25% by 2030.

1. Collect organic materials and turn into energy and reusable asset:
    - Launch citywide curbside organics collection by 2024.
    - Expand commercial organics separation requirements to all food businesses by 2026.
    - Leverage existing DEP infrastructure to process collected organics into biogas and compost within the city as much as possible.
2. Develop new markets and expand recycling and reuse:
    - Expand the Parks' tree wood reuse pilot by 2024.

New York State Laws and Policy

New York State Solid Waste Management Plan

The New York State (NYS) SWMP outlines programs, initiatives, and legislation to reduce food waste, as well as support food donation and food scrap recycling.[7]

› These initiatives include efforts to expand the existing Food Donation and Food Scraps Recycling Law, which went into effect in 2022; allow composting facility operation on municipal park lands; and establish good faith effort from state agencies to sustainably manage organic material.

› Enhancement of ongoing *NYS SWMP* programs include the promotion of additional organic recycling pathways, expansion of anaerobic digestion for food scraps, encouragement of partnerships between retailers and food donation organizations, and the continued development of educational material about food waste.

› Proposed programming includes resources, guidance, and funding to schools, businesses, and organizations to support food waste reduction and expansion of organics recovery. The *NYS SWMP* also proposes partnership development and the publication of successful organics collection initiatives.

New York State Climate Leadership and Community Protection Act (CLCPA)

CLCPA adopted measures to put the state on a path to reduce statewide GHG emissions by 85% from 1990 levels and net zero emissions in all sectors of the economy by 2050.

GHG emissions, including carbon dioxide (CO_2) and methane (CH_4), are associated with the processing and disposal of organic waste. Primary organics management options include landfilling, combustion, anaerobic digestion, composting, and mulching. Organic waste disposed in the anaerobic environment of landfills generate methane, which is more potent than carbon dioxide. Landfill methane capture programs reduce emissions associated with organics from landfills. Anaerobic digestion also produces GHG emissions, which can be captured and used. GHGs captured at landfills and in anaerobic digesters may leak or be flared. Flared methane produces carbon dioxide. Composting or digesting organics produces less GHG emissions than landfilling them. Additionally, composting improves soil carbon sequestration and maintains soil nutrients.[54,55]

To reduce GHGs emissions associated with organics, CLCPA outlines the following relevant strategies:

1. Expand Organic Waste Reduction and Recycling

    - Significant reduction in the disposal of organics

- Financial assistance for food donation
- Reduction of food supply chain losses
- Financial assistance for organics recycling infrastructure
- Expansion of food scraps collection and recycling at multi-family buildings
- Markets for compost, digestate, and similar products
- Food waste reduction and donation for businesses
- Composting on public park land
- Outreach and education to promote organics recycling
- Engagement with the farming community
- Improve Water Resource Recovery Facility Conversion
- Beneficial use
- Optimization and expansion of anaerobic digestion

2. Reduce Fugitive Emissions of Methane and Co-Pollutants from Solid Waste Management Facilities

    - Landfill gas capture for active landfills
    - Control emissions from closed landfills
    - Enhanced landfill cover systems
    - Emission monitoring and emission reduction
    - Funding to aid municipal landfills
    - Research
    - Co-pollutant control

3. Reduce Fugitive Emissions of Methane and Co-Pollutants from Water Resource Recovery Facilities

    - Capture and beneficially reuse fugitive biogas
    - Monitoring
    - Ensure proper maintenance of septic systems at the municipal level
    - Operator training
    - Research
    - Co-pollutant control

4. Establish market for recovered resources and biogas utilization

    - Market development for recovered resources
    - Recyclables in green procurement
    - Production tax credit for recycled products
    - Organics roadmap
    - Research on markets
    - State purchasing

Food Donations

The New York State Food Donation and Food Scrap Recycling Law requires businesses and institutions that generate an average of two tons of wasted food per week or more to: 1) donate excess edible food and 2) recycle all remaining food scraps if they are within 25 miles of an organic recycler. The law went into effect on January 1, 2022.[56] New York City is exempt from this State law because the local law in place requires the diversion of food scraps from disposal. In 2024, 1,145 establishments in New York State were required to comply through donations of excess edible food, and 451 were required to recycle food scraps.[57]

6. New York City Organics Management

Organics can be managed beneficially or disposed. Citywide organics collection is becoming more common in North America, as cities like Vancouver, Montreal, Portland (OR), and San Francisco develop and expand upon their ability to manage organics locally. The benefits of local management of organics include lower costs compared with disposal, reduced GHG emissions from transportation and decomposition, and beneficial reuse of organic waste end products, such as compost and mulch.

Key Agencies

In New York City, key agencies involved with organics programming include: DSNY, DEP, NYCPS, the Mayor's Office of Climate & Environmental Justice (MOCEJ), the Department of Citywide Administrative Services (DCAS), NYCHA, and Parks. Nonprofit organizations partner with agencies to support organics management. Likewise, certain organizations operating within New York City and receiving New York State funding, including the Battery Park City Authority (BPCA) and the Hudson River Park Trust (HRPT), offer composting programs. Organics management is complex and relies on coordination by multiple city agencies, nonprofits, and businesses.

DEP treats the New York City's wastewater at 14 wastewater resource recovery facilities (WRRFs). DEP also manages the anaerobic digestor at the Newtown Creek WRRF, which processes biosolids and source separated organics such as food waste.

NYCPS is the largest school district in the United States with around 1 million students. Schools serve lunch each day and receive source-separated organics collection service from DSNY.

MOCEJ uses a public health and equity approach to develop and advance programs, policies, and projects that protect New Yorkers from the impacts of climate change, make the City's infrastructure more sustainable and resilient, and reduce pollution. MOCEJ collaborates with DSNY and other City agencies on sustainability and environmental justice initiatives.

DCAS recruits and trains City employees, manages procurement for City agencies, and manages City assets, including 55 public buildings and the municipal vehicle fleet. DCAS has a number of sustainability initiatives.

NYCHA houses 3.5% of the City's population and plays an important role in overseeing waste management for those residents. Some NYCHA properties compost on-site or receive compost for use on property grounds.

Parks manages 14% of New York City's land, comprised of around 30,000 acres of parks, recreational facilities and athletic fields, beaches, and more. Parks also manages the city's street trees and trees in parks as well as wood waste from trees. Parks can compost on-site and use compost. Additionally, five parks per borough are required to host compost sites per LL118.

In part, the range of stakeholders involved with organics management can be explained by the variety of organics subtypes, the different generators, the quantity of waste generated and recovered, the types of facilities, and the capacity of those facilities. Although it would be simple to have one-size-fits-all organics processing facilities, different materials have different requirements.

Organics Facilities and Capacity

Organics can be managed at small or community (<1,000 ton/year), mid-size (1,000–10,000 ton/year), and industrial (>10,000 tons/year) scales. New York City has several mid-size and industrial organics pre-processing or processing sites that each manage at least 1,000 tons of material per year. **Figure 8** shows the locations of these sites. The sites include composting facilities, anaerobic digestion facilities, transfer and pre-processing facilities, and mulch piles.[58]

As of 2025, DSNY has the capacity to process nearly 400,000 tons of organics annually for beneficial reuse through DSNY infrastructure and contracts with vendors. This is sufficient to manage the current quantities of DSNY-managed organics. In 2023, around 38,000 tons of source-separated organic waste were collected by DSNY. An additional 35,000 tons of organic waste were also composted at DSNY-managed sites. Based on the Citywide Residential Organics Program collections through July 2025, the annual collections for 2025 are projected to be 110,000 tons (accounting for the remainder of the year and the leaf season). This tonnage is expected to grow significantly with the implementation of organic waste diversion programs over the course of the *SWMP26* planning period, and additional contracted capacity will be needed. Additional details on capacity can be found in **Attachment C: Accessible Capacity for New York City Waste Management.**

It should be noted that the projected quantity of organics by substream (i.e., food scraps, leaf and yard waste, FOG, etc.) is not calculated. Therefore, the type(s) of organics management facility capacity required is unknown. **Table 6** summarizes the organics waste recovery and capacity of facilities owned, operated, or contracted by the City.

Figure 8. New York City Medium to Large-Scale Organics Processing Facilities

Table 6. DSNY-Collected Organics Waste Capacity and Recovery, New York City Facilities and Contracts

Facility Name	Destination / use	Mechanism	SSO Capacity (TPD)	Other Capacity	Recovery Rate
DSNY-Parks Soundview Park	NYC Metro Area	Windrow composting and mulching	0	3,780 TPY (Yard trimmings and leaves)	NA
Waste Management of NY – Varick Avenue	Newtown Creek WRRF and Compost/Mulch in NJ/PA	CORe Pre-processing	300		85%
American Recycling	Pine Island Farm AD and Compost/Mulch on Long Island	Thor Pre-processing	150	570 TPD total capacity (150 set aside for organics)	55%
DSNY's Staten Island Compost Facility (SICF)*	NYC Metro Area	Compost windrow and Mulch processing facility		105,000 CY/year of yard trimmings and tree debris	
				70,000 CY/year of tree debris	
		Tiger depack pre-processing; composting facility	NA		
		Micro-membrane covered aerated static pile composting system	100	Up to 600 TPW of SSO	NA
NYC DEP Newtown Creek WRRF	Renewable biogas production; landfill cover (biosolids)	Anaerobic Digester	250		75%
Rikers Island Compost Facility	Rikers Island	BDP Windrow system	-		NA
Cunningham Park Mulch Pile	chipped for reuse	-	-	Follows DEC mulch facility sizing guidelines	NA

Notes: SSO–source separated organics; TPD–tons per day; TPW–tons per week; TPY-tons per year; CY–cubic yards; WRRF–wastewater resource recovery facility
*SICF can process ten tons per day with the Tiger depack pre-processor and up to 150 TPD in the aerated static pile system but has maximum weekly capacities of 600 tons per week for SSO acceptance. SICF's overall capacity for SSOs is 600 TPW, which was divided by 6 operating days a week to calculate average daily capacity.
Organics capacity for the American Recycling facility is a portion of the putrescible permit capacity listed in LL152.
Source: 2022 DSNY Organics Processing and Pre-Processing Contracts and Outlets Data; 2024 DSNY Contract List.

Transfer Stations

Transfer stations receive, consolidate, and facilitate the transport of refuse, including organic waste. The centralized collection of solid waste at transfer stations increases transportation efficiency. Private transfer stations are used to manage commercially generated organic materials, as well as some DSNY-collected organic materials.[12] Varick Street Transfer Station is one of the transfer facilities used to manage organic waste. This transfer station also includes a pre-processing facility, where public and private organics are accepted and converted into a slurry, which

is then transported to the Newtown Creek WRRF to be anaerobically codigested with sewage.[58] Between 2016 and 2023, the following New York City private transfer stations received source-separated organics:

1. Action Environmental Systems (Bronx)
2. Metropolitan Transfer Station (Bronx)
3. Brooklyn Transfer, LLC (Brooklyn)
4. Waste Management of NY—Varick Avenue (Brooklyn)
5. Hi-Tech Resource Recovery, Inc. (Brooklyn)
6. American Recycling Management, LLC (Queens)
7. Regal Recycling, Inc. (Queens)
8. Tully Environmental (Organics Pilot) (Queens)

The 2018 Waste Equity Law reduced the permitted capacity of putrescible and non-putrescible private transfer stations in the Bronx, Brooklyn, and Queens. Exceptions to permitted capacity limits included the processing of recyclables and organic waste. As a result of the Waste Equity Law, some facility permits designate a minimum amount reserved for SSO.

For example, Varick Avenue Transfer Station permits were modified to accommodate food waste processing. The facility capacity was adjusted for a total of 4,310 tons per day: 500 tons of source-separated organic waste, 210 tons of liquid organic waste, 30 tons of yard waste, 30 tons of sewage grit and screenings, and 3,540 tons of putrescible solid waste.[59] As of 2025, the Varick Avenue Transfer Station is the only facility in New York City contracted to process organic waste into a slurry for anaerobic digestion at the Newtown Creek WRRF.

Table 7 shows the tons of organics from DSNY and the commercial sector managed in 2023 at private transfer stations in New York City.

Table 7. 2023 Source-Separated Organics Managed at Private Transfer Stations

Facility	Source-Separated Organics Received (Tons Per Day)	Amount Reserved for SSO, If Any (Tons per Day)
Brooklyn Transfer Station (Brooklyn)	2	112
Waste Management of NY (Varick Avenue, Brooklyn)	213	-
Hi-Tech Resource Recovery (Brooklyn)	7	100
American Recycling (Queens)	36	-
Regal Recycling Co., Inc. (Queens)	89	120
Total Received	**347**	**-**
Note: Includes organic materials collected from the commercial and residential sectors that are managed at private transfer stations. **Source:** 2023 Private Transfer Station Reports on food waste; DSNY Organics Tracking; Waste Equity Law 2024 Report.		

Anaerobic Digestion at Wastewater Resource Recovery Facilities

Anaerobic digestion decomposes organic material using heat in the absence of oxygen. This process produces biogas (a mixture of methane and carbon dioxide) and digestate, which can be converted into biosolids. Anaerobic digestors are used to process sewage sludge or a combination of sewage sludge, food waste, food-soiled paper, FOG, manure, and certain yard waste. When a combination of materials is processed, the process is referred to as codigestion.

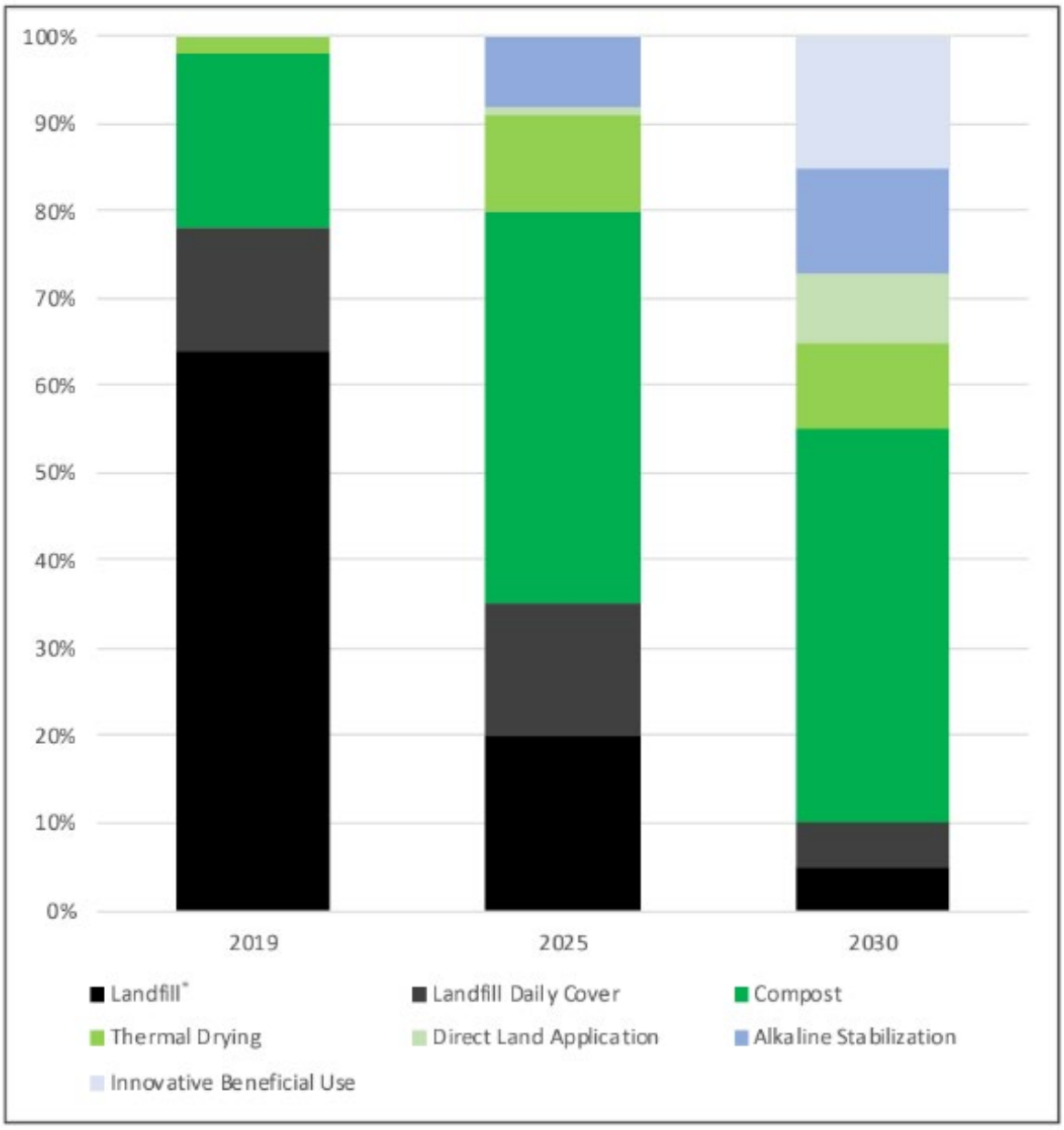
New York City has 14 WRRFs, six of which have dewatering capabilities. WRRFs can also codigest food waste and FOG alongside sewage sludge. Of the 14 facilities, only Newtown Creek WRRF processes both wastewater and food waste through its on-site anaerobic digester. In calendar year 2024, 67,948 wet tons of food scraps were processed at Newtown Creek WRRF. Approximately 274,000 MMBtu of biogas was generated at the facility from a combination of food scraps and sewage sludge. Biosolids can be used as fertilizer in agricultural settings, to fill in mines, and as daily landfill cover. **Table 8** shows the management of biosolids produced by the City's WRRFs by end use.

Table 8. Biosolid End Uses, Fiscal Year 2024

Disposition	**% of Total**
Landfill	42
Composting	28
Alkaline stabilization/mine or agricultural use	13
Thermal drying	15
Direct land application	2
Source: DEP Biosolids Data Request for SWMP26[60]	

Figure 9 shows DEP's 2019 and expected 2025 and 2030 biosolids management.

Figure 9. Expected Biosolids Management[61]



Expected biosolids management under the City's new contracting strategy.

* With a comprehensive plan to reduce waste, improve recycling rates, and divert organics from landfill, New York City aims to reduce the amount of material it sends to landfill by 90% by 2030.

Composting Sites and Facilities

Composting is a bioconversion method which accelerates the natural biological process of the breakdown of organic waste by placing the waste in an aerated, dark environment, which allows aerobic microbes to break down waste into a nutrient rich humus product that can be used as fertilizer. Composting methods include windrow, forced air/aerated static pile, in-vessel, and vermicomposting (composting using worms to break down material). **Table 9** shows the amounts of organics processed in 2023 at the various New York City composting facilities, where known; and the processing techniques used. The time required for food scraps and leaf and yard waste to decompose and convert into compost varies based on the type of technology, types of organic materials, and seasonality. This can affect capacity of facilities throughout the year.

The Staten Island, Rikers Island, and Soundview Compost Facilities are DSNY-owned windrow composting facilities operated under contract with Denali Water Solutions. SICF is authorized to accept up to 105,000 cubic yards of yard trimmings and tree debris per year and includes a mulch processing facility authorized to accept up to 70,000 cubic yards of tree debris per year. SICF is also currently authorized to accept up to 600 tons per week of source-separated organics. Prior to the Citywide Residential Organics Program, most of the material received at SICF was from private landscapers, many of whom provide services to New York City residents. Manure is also received from the NYPD mounted command.

The Rikers Island Facility processes food scraps from New York City Department of Corrections activities on the island. All compost produced is used on the island. The Soundview Facility processes leaves and other woody debris, mostly collected from residents of the Bronx and Parks. **Table 9** summarizes the tonnage processed by these facilities in 2023. All three facilities file annual reports with DEC per the requirements of NYCRR Part 360.

Currently, Soundview Park is permitted for leaf and yard waste.

Table 9. New York City Composting Sites and Facilities Processing Types and Techniques

Facility or Site	Organic Types	Tons Processed in 2023	Processing Technique
Industrial-Scale (>10,000 TPY)			
Staten Island Compost Facility	Leaf and yard waste, manure, residential organics	30,155	Mulch processing facility, Tiger Depack pre-processing; composting facility; micro-membrane covered aerated static pile composting system58
Mid-Size (1,000 – 10,000 TPY)			
Rikers Island Compost Facility	Food waste	2,164	BDP Windrow System
Soundview Park	Residential and other leaf and yard waste	409	Turned windrows, mulching 58
Small or Community Scale (<1,000 TPY)			
Salt Lot	Food waste	312	Forced air
Queens Botanical Garden Farm and Compost	Food waste	52	Aerated static pile and various small-scale systems
Earth Matter Compost Learning Center – Governor's Island	Food waste	642	Various
Hudson River Park Community Compost	Leaf and yard waste; food waste	60	EcoRich Rapido 2000 industrial

Table 9. New York City Composting Sites and Facilities Processing Types and Techniques

Facility or Site	Organic Types	Tons Processed in 2023	Processing Technique
			composter
Battery Park City Authority	Leaf and yard waste; food waste; pet waste	17.5 (based on 2019 data)	In-vessel composting
Note: *Planned reopening in 2025 **Sources:** DSNY,[58] Gowanus Canal Conservancy,[62] Hudson River Park Community Compost Tracker,[63] Battery Park City Authority[64]			

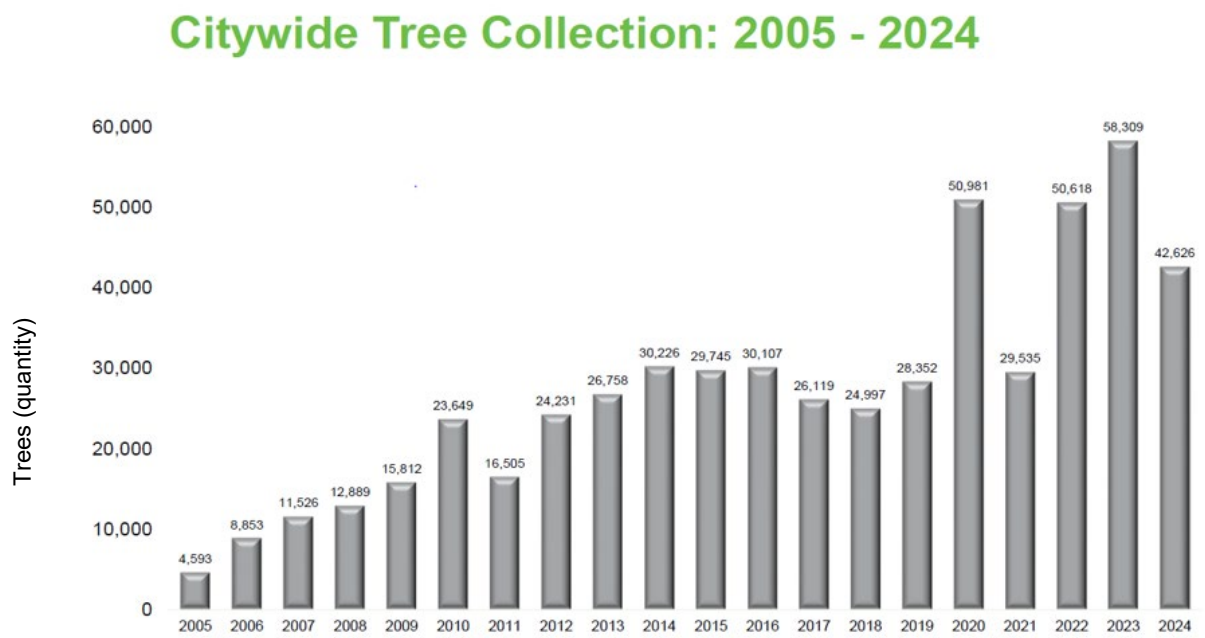
Community composting includes small scale composters in New York City in public parks or in private facilities and residences. Parks, through the GreenThumb program, supports over 550 community gardens, many of which include composting sites.[65]

Chipping Facilities

Chipping facilities are "facilities that process yard trimmings (other than grass clippings), tree debris, and wood debris into mulch. Chipping facilities do not include the processing of construction and demolition debris into mulch."[66] Mulch can be used in landscaping to reduce soil erosion, mitigate the growth of weeds, and reduce the evaporation of water from the soil's surface. New York City Parks hosts community events such as Mulchfest, an annual event that allows the public to bring their Christmas trees to process into mulch.[67]

Figure 10 shows the quantity of trees collected and chipped as part of Mulchfest from 2005-2024. The decrease from 2023 to 2024 is the result of fewer trees left over from tree vendors under concession agreements with Parks.

Figure 10. Citywide Tree Collection, 2005-2024.



Source: *New York City Department of Parks and Recreation*

Used Oil Processing

Used cooking oil is converted into biodiesel for use as fuel by filtering and chemical processing. Almost all used oil managed in New York City is collected and processed by the private sector. Used oil can also be codigested with sewage sludge at WRRFs such as Newtown Creek, but data is not available on how much used oil is processed in WRRFs in New York City. Some details on used oil collection, transfer, and processing are available through annual facility reports to DEC, but that represents less than 20% of the FOG amount reported through Private Carter Surveys. Information from annual reports to DEC shows that used oil is filtered at oil processing facilities and private transfer stations. Wastewater and food particles that result from this process are sent to WRRFs and/or transfer stations (as a mixture or separated while the filtered oil is sent to additional oil processors for further refinement into biodiesel. In New York City, there are fewer than 10 waste oil recyclers.

Thermal Treatment

Thermal treatment processes include incineration, pyrolysis, biomass gasification, hydrothermal carbonization, and wet air oxidation. Highly concentrated solids are heated in a limited or oxygen-free environment, resulting in biochar, syngas, bio-oil, or a combination of the three. Incineration is the most common form of thermal treatment in the United States. A portion of New York City's refuse (and therefore organic material disposed of with refuse) is processed at incinerators.

- In 2022, nearly 1 million tons of putrescible waste (refuse) managed by DSNY was sent to regional incinerators. Of this, an estimated 360,000 tons would be suitable for composting, according to the *2023 Waste Characterization Study*.
- The quantity of organic materials in refuse that is incinerated will likely decrease with the full implementation of the Citywide Residential Organics Program.

Landfills

Landfills serve as end-sites for refuse disposal and a last resort for discarded organics, considering the waste management hierarchy, which prioritizes reducing and recycling waste over disposal. Landfilled organic matter decays and produces methane, a GHG that contributes to climate change. MSW landfills are equipped with methane capture technology and the recovered methane can be used as fuel.

There are no active landfills in New York City since the Fresh Kills Landfill stopped accepting waste in 2001. However, a portion of refuse generated in New York City is sent to upstate and out-of-state landfills. The following quantities of organic materials were sent to landfills:

- Approximately 800,000 tons of organic materials (of the 2.2 million tons of DSNY-managed refuse) in 2023.
- Approximately 178,000 wet tons of biosolids managed by DEP in FY24.
- Approximately 10,000 tons of residue from source-separated organics managed by DSNY in 2023.[15]

The amount of organic waste generated by New York City's commercial sector that is sent to landfills is not tracked, as there are no requirements for commercial entities to report the end destinations of their waste to DSNY.

The increase in landfill tipping fees and the limited capacity in landfills in the Northeast, as well as limited space for siting new landfills, further support the need for expanded organics recovery.

Animal Feed

Food waste, if handled and processed correctly, may be beneficially used for animal consumption. New York State regulations include requirements that ensure the safe handling, processing, and transportation of food waste for animal feed. New York State requires that some animal feed operations in the state apply for Beneficial Use Determination (BUD) from DEC. Certain materials, including spent brewery grains and bakery waste, are considered to be pre-determined beneficial use materials and therefore do not require BUD applications. Other food scraps must undergo processing prior to being used as animal feed. Animal-derived food scrap waste may be used as feed for cattle, swine, and poultry, so long as it is commercially sterilized under high temperatures. Animals may be subject to quarantine if suspected by the New York State Department of Agriculture to have been fed untreated animal-derived feed. Non-animal derived, pre-consumer food scrap waste does not require heat sterilization prior to being repurposed as animal feed. This may include scraps that are generated through the preparation of fruit, vegetables, grain, and even dairy.[68,69]

Overview of Organics Materials and Management

As discussed, organic materials require specific processing depending on type. The best management options for each type of organic waste are summarized in **Table 10**. While there are pathways for processing and beneficial use of organic waste, the capacity of organic waste infrastructure is limited, and currently not all of the collected organic material is beneficially used.

Table 10. Best Management Options for Organic Materials

Material Type	Community or Windrow Composting	Forced Air/Aerated Static Pile	Chipping Facility	WRRF	Other
Food Scraps	X	X		X	
Food-Soiled Paper		X			
FOG				X	X*
Leaf and Yard Waste	X	X	X		
Wastewater				X	
Industrial					X**
Manure		X			
Waste Lumber					X***

Notes: FOG = Fats, oils, and grease;
* FOG can also be recycled into fuel or mixed with food or food scraps for animal feed.
** Industrial waste best management practices are material specific. For example, wood shaving or wood dust may be converted into wood pellets or bricks for use in animal care or as an energy source.
*** Waste lumber, depending on the quality and previous use, may be salvaged and reused into building materials. Uncontaminated, untreated waste lumber can be chipped.

7. Organic Material Management Discussion

Over 2 million tons of organic waste are generated each year in New York City. The recent increase in organic waste collection requires consideration of the city's current and future capacity to manage organic waste appropriately. Factors driving organics recovery in New York City include climate and waste management goals and legislation, available organics processing infrastructure, and the relatively high costs associated with disposal.

Citywide plans (including *SWMP26)* and local laws aim to increase waste reduction, reduce GHG emissions, and expand diversion in the city to benefit New Yorkers and build the city's green economy.

A 2021 Fiscal Brief from New York City's Independent Budget Office (IBO) found that increasing organics collection would reduce the per-ton cost differential between organics collection and recycling and disposal collections. The brief noted that the prioritization of organics recovery by city government and the public will improve the financial and environmental sustainability of the residential organics program.[70]

Benefits

Local organics recovery provides financial, community, and public health benefits, including, but not limited to, the following:

- Reducing the cost of long-distance transport of discarded material
- Avoiding emissions that would occur if the organics were managed at landfills or incinerators
- Making compost, mulch, biogas and biodiesel, available locally
- Supporting urban agriculture and environmental education initiatives.
- Reducing contamination of other waste streams and potentially increasing recoverability of metal, glass, plastic, and paper separated for recycling.

Organics Recovery Challenges

Primary challenges to organics recovery include source separation for collection, contamination (which can affect the quality of end products, like compost), available and appropriate capacity, facility planning and permitting, and equitable organics management.

Contamination

Source-separated organics in both residential and commercial settings provide opportunities for increasing the diversion of waste from landfills and incinerators. However, contamination of source-separated organics with other waste can pose processing challenges and increase costs.

Based on the *2023 Waste Characterization Study*, organics contamination was 4%. This low contamination rate can be attributed to voluntary participation in organics, education and outreach efforts, and seasonality. Since the *2023 Waste Characterization Study*, the rollout of the Citywide Residential Organics Program was fully implemented. The scale of this program has resulted in higher rates of contamination as residents are allowed to use plastic bag liners. Plastic garbage bags are the largest source of contamination in the organics waste stream (0.8% of collections), followed by paper and cardboard (0.5%). Since the implementation of the Citywide Residential Organics Program, SICF has had to more extensively pre-process organics collections.

Contamination of organic waste can impact organic processing facilities by introducing contaminants into products (such as compost) and/or interfering with processing. Commercial processors can refuse to contract with waste generators, such as municipalities, if the organics contamination rate is too high.

Increased public education efforts, incentives, and other measures may need to be taken to expand participation in organics programs and to reduce contamination through proper organics separation.

Commingling of leaf and yard waste, FOG, and food waste can disrupt material management. For example, tree branches cannot be processed by the Varick Street Transfer Station's CORe Processor into a slurry and are not desirable for codigestion at WRRFs. Tree branches are therefore manually separated from other organic waste processed at the Varick Street Transfer Station. Similarly, only certain compost facilities can accept pet waste, biodegradable plastic, or meat and bones. To overcome the challenges posed by commingling or contamination of organic waste streams, some organic management infrastructure has been developed to accept a certain percentage of organic waste contamination.

The Citywide Residential Organics Program allows residents to comingle organics (i.e. food scraps and leaf and yard waste). Combining these organic subtypes makes it challenging to quantify each material separately. It also requires organics processing facilities to have the ability to process the combination of materials. While much more efficient from a collection perspective, this is a primary challenge for New York City residential SSO.

Available and Appropriate Capacity

Capacity is impacted by seasonality of organics waste generation. For instance, in winter, holiday trees are disposed. These are collected curbside but chipped rather than composted or digested like other residential organics, which typically include food scraps and some leaf and yard waste. In 2023, over 900 tons of holiday trees were collected, creating a short but significant change in organics collection. Similarly, in the fall, leaf litter collected as part of residential collections increases. Composting requires a specific ratio of food scraps and leaf and yard waste. Thus, facilities need to adjust their processes to account for varying compositions of organics waste.

DSNY currently has contracts with facilities that would allow for the transfer and processing of 388,000 tons of source-separated organics annually. The amount of separated organics managed by DSNY is projected to increase to over 440,000 tons in 2036 with the implementation of *SWMP26* proposed organics diversion programs, which may require DSNY to further increase the amount of contracted capacity or to construct additional capacity.

Some organic subtypes are more conducive to industrial-scale processing facilities outside of the city, as space is less of a constraint in less dense urban areas. Some recovered products, such as Class B biosolids, are likewise more suitable for land application and site remediation outside of the city. (Biosolids are designated as Class A or Class B based on the treatment methods used to process wastewater. The class of biosolids determines the allowable disposal locations and uses of biosolids. DEP has various contracts for managing biosolids, some of which are beneficially reused as Class A material by composting, by thermally drying, and by lime stabilization. Some Class B biosolids are used for land application, and some are disposed of in landfills.).

Facilities Planning and Permitting

New York City owns, operates, or manages several organics recovery facilities. This avoids the challenges associated with contracting with commercial processors, who do not always want to enter contracts with customers whose organic waste has high contamination rates. However, developing an organics recovery facility may require multiple permits, including a waste management permit from DEC, as well as local zoning and building permits depending on the size, location, and infrastructure planned. New facilities may also require environmental review.[71]

Equitable Organics Management

A 2023 analysis of organics management explored issues with and options for equitable organics management as cities expand organics collection programs. The study recommends that to reduce concerns about contaminants, compost feedstock should be tested. The study also notes concern about the equitable distribution of compost:

> "Especially for food-insecure neighborhoods, CGs [community gardens] and urban farms may provide strong benefits. Use of compost is well accepted as a regenerative growing process. Availability of and access to compost must be ensured for communities with low food security and high climate risk. Removal of organic waste without a contractual obligation to return the tested, finished product to residents who want the compost threatens the equity of growing and minimizes the potential benefits of urban agriculture."[72]

In 2025, DSNY operated seasonal compost giveback sites in Staten Island, Brooklyn, and Queens from April to September and held pop-up community giveback events throughout the City. At these sites and events, all New York City residents are eligible to receive free bags of compost made from food scraps, food-soiled paper, and yard waste collected by DSNY. After registering, residents may pick up free 40-pound bags of compost. DSNY also provides free compost, mulch, and when available, wood chips to other New York City agencies and nonprofits for their programs, construction, or landscaping projects. For larger projects, DSNY can also deliver pallets of free compost (consisting of sixty 40-pound bags) to New York City agencies, nonprofit organizations, New York City community gardens, and volunteer street-tree care organizations.

Other Considerations

In addition to logistical challenges associated with organics management, public health and economic and administrative shifts can affect organic waste management. Specific examples include the impact of COVID-19 on participation in organics programs as well as the infrastructure available to process organic materials. Additionally, budget changes can impact composting programs and other available infrastructure for organics management, as observed with the New York City Compost Program.

Key Points

- Organics make up approximately one-third of New York City residential waste, but in 2024, less than 10% of that waste was diverted. The Citywide Residential Organics Program, fully implemented in 2025, has notably improved the residential organic waste capture rate. *SWMP26* programs and other efforts will further increase the capture rate.
- The recovery of organics provides important socioeconomic and environmental benefits, including alleviating hunger through food rescue and donation programs, reducing waste disposal costs, recovering organic material for beneficial use, and job creation.
- *SWMP26* programs—particularly the Organics Diversion and Recovery Program, the Commercial Waste Program, and the Education and Outreach Program—will further support organic recovery efforts and the beneficial use of organic materials.
- DSNY's current organic recovery capacity is sufficient for now but may need to be expanded to manage more recovered organic material in the future.

Endnotes

[1] The information included here summarizes and supplements the research and data collection effort conducted as part of the Citywide Organics Study (COS). The COS was a Department of Citywide Administrative Services (DCAS) planning contract that was suspended in the 2022 budget crisis.
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NYC Solid Waste Management Plan 2026

Attachment F: Commercial Waste in New York City

This attachment provides an overview of New York City's commercial waste system, including waste generation, past and current practices, and relevant local laws, with a focus on the Commercial Waste Zone (CWZ) program. The CWZ program was authorized by Local Law 199 of 2019 to reform the City's commercial waste system. The program aims to reduce truck traffic and emissions, increase the diversion of organics and recyclables, improve public health and worker safety, provide fair and transparent pricing for businesses, and support New York City's waste and sustainability goals.

Section 1 of this document summarizes the history and current practices of commercial waste collection in New York City, including the development of the CWZ program, the types of commercial waste generated, and commercial waste management processes and facilities. Sections 2 and 3 describe local and state commercial waste laws and policies, respectively.

1. New York City Commercial Materials Waste and Management Practices

Brief Background of Commercial Waste and the Zoning Program

The New York City Department of Street Cleaning was created in 1881, in response to the large volume of unmanaged solid waste in the city. Initially focused on collecting waste from New York City streets, the department became the New York City Department of Sanitation (DSNY) in 1929 and expanded to include commercial, residential, and institutional waste collection. Private businesses started collecting commercial waste in the late 1950s, and, beginning in 1989, recycling became mandatory for residential, commercial, and institutional waste disposal. To combat corruption and organized crime within the commercial waste industry, the City passed Local Law 42 in 1996, —creating the Trade Waste Commission, now known as the Business Integrity Commission (BIC). BIC has since been responsible for removing criminal influences from the commercial waste management industry by performing background investigations, setting rate scales for service, and issuing licenses and registrations.[1]

In 2016, DSNY and BIC conducted a Private Carter Study, which established momentum for the publishing of *Commercial Waste Zones: A Plan to Reform, Reroute, and Revitalize Private Carting in New York City*, also known as the *CWZ Implementation Plan* of 2018. It is important to note that the CWZ Implementation Plan excludes specialized or intermittent waste streams such as construction and demolition (C&D), electronic, medical, and hazardous waste, and scrap metal.

The CWZ Implementation Plan was crafted over a seven-year period and included both an environmental review process, industry analysis, and a series of stakeholder engagement opportunities.

The DSNY project team leading the development of the CWZ Implementation Plan met with more than 100 stakeholders, including commercial businesses, labor groups, environmental justice advocates, private carters, real estate owners, traffic safety advocates, and others. Following the Plan's publication, stakeholder engagement with this robust group continued.

The CWZ Implementation Plan identified long service routes that overlap with those of competitors as one of the issues with commercial waste management. This resulted in concerns about road safety, efficiency, staff working conditions, air quality, and noise pollution in the management of commercial waste.

The City has taken steps to remedy these issues over the years. BIC has implemented regulations and oversight; however, many businesses remain unaware of their full rights and resources when contracting with carters. To address air pollution, in 2013, the City passed Local Law 145, which required all carters to upgrade their fleets to at minimum be equipped with engines certified to the 2007 United States Environmental Protection Agency (U.S. EPA) emission standard. Section 2 expands upon these and other local laws the City has implemented regarding commercial waste management.

Complementing previous actions, the CWZ Implementation Plan proposed new commercial waste zones. Under this program, 20 geographic commercial waste collection zones were identified for the City's five boroughs. The first—the Queens Central zone, which includes the neighborhoods of Jackson Heights, Corona, Elmhurst, and parts of Forest Hills and Ridgewood—was fully implemented on January 3, 2025.[2]

Under the new CWZ system, the City's private carters will be able to maintain a level of market competition in order to continue innovation in the industry. Contracts for each of the zones are based upon the principle of securing health and safety, labor and worker rights, infrastructure and waste management, and robust competition. Carters participated in a competitive procurement process for all zones throughout the City, but no carter was awarded service contracts in more than 15 zones, and all awardees are required to meet strict standards for safety, customer service, and labor conditions. The next two zones slated to be implemented cover the Bronx. These are expected to be active in late 2025. All New York City businesses are projected to have their waste managed by awarded carters by the end of 2027, marking full implementation of the CWZ program. The final three zones to be implemented in this process will be those that cover Upper Manhattan, the Upper East Side and Southwest Brooklyn.[2]

The CWZs are expected to have a positive impact on public safety, waste reduction, environmental health, pricing, and customer service. The goals in each of these areas are as follows:

- **Public Safety:** Improve the safety practices of the private carters through mandated worker safety training, contractual requirements, and enhanced enforcement
- **Waste Reduction:** Reduce commercial waste disposal and incentivize recycling and composting
- **Environmental Health:** Reduce truck traffic throughout the city to cut down air pollution and improve quality of life for New Yorkers
- **Pricing:** Provide fair, transparent pricing for businesses large and small
- **Customer Service:** Strengthen customer service standards and establish accountability

The CWZ program underwent an extensive environmental review pursuant to the State Environmental Quality Review Act (SEQRA) and the City Environmental Quality Review database (CEQR)[3], whereby DSNY served as the lead agency. DSNY completed an Environmental Assessment Statement and issued a Positive Declaration and Draft Scope of Work in advance of preparing an Environmental Impact Statement (EIS). A public meeting was held to receive comments on the Draft Scope of Work. Comments were accepted following the public meeting, and a Final Scope of Work was published after the comment period closed. The Draft Generic Environmental Impact Statement (DGEIS) was made available for public review followed by a public hearing with comments accepted after as well. The Final GEIS (FGEIS) was published, and DSNY issued its Statement of Findings. The New York City Council and the Office of the Mayor approved the CWZ program soon after.

A Technical Memorandum was issued to assess post-FGEIS modifications to the CWZ program (modifications related to the number of carters and subcontractors per zone, exemptions for waste collected by micro-haulers, the consideration of price in the request for proposal, residential and institutional supplemental service, employee retention requirements, containerized contracts, health and safety training, and rates). A second Technical Memorandum followed which assessed the post-FGEIS modifications related to the number of zones in Manhattan and Brooklyn and the inclusion of joint areas of interest, such as parks and airports. Finally, a third Technical Memorandum was issued to address the post-FGEIS changes in background conditions (e.g., COVID-19, the Central Business District Tolling Program, and the expansion of DSNY Organic Waste Rules) and new information related to the competitive procurement process. **Table 1** shows the timeline for this process.

Table 1. Environmental Review Timeline

Environmental Review Process Step	Date of Action
Positive Declaration and Draft Scope of Work	November 5, 2018
Public Meeting on Draft Scope of Work	December 11, 2018
Comment Period for Draft Scope of Work Closed	January 4, 2019
Final Scope of Work Published/Draft Generic Environmental Impact Statement (DGEIS) available for public review	February 22, 2019
DGEIS Public Hearing	March 11, 2019
Comment Period for DGEIS Closed	April 8, 2019
Final GEIS (FGEIS) Published	September 17, 2019
DSNY Statement of Findings Issued	October 1, 2019
New York City Council Statement of Findings Issued/ First Technical Memorandum Issued	October 25, 2019
Office of the Mayor Statement of Findings Issued	October 28, 2019
Second Technical Memorandum Issued	February 13, 2020
Third Technical Memorandum Issued	January 11, 2024

Breakdown of Materials in Commercial Waste

About 2.1 million tons of commercial waste was managed in New York City in 2022, according to data from private transfer station quarterly reports to DSNY.[4] The majority of this waste was putrescible municipal solid waste (MSW), which includes soft organic materials with high moisture content, such as food waste. Other waste streams included recyclable paper —such as office paper, cardboard, and newspapers—and other recyclables categorized by how they are collected. Single-stream recyclables, which include materials like cardboard, aluminum cans, and plastics, are disposed of in a single collection receptacle, whereas source-separated recyclables are sorted before collection into designated receptacles for categories such as plastic, paper, and organics. While putrescible MSW is collected as refuse, a significant portion of commercial waste is diverted for recycling. In 2022, commercial establishments recycled a total of 542,749 tons, including paper, single-stream recycling, mixed glass, plastic, and metal waste (MGP), textiles, and source-separated recyclables.[5] These tonnage estimates do not include any waste that was managed outside of New York City, but generated by commercial entities within the City.

In the second half of 2023, DSNY distributed a voluntary survey to 747 private waste carters, to which 378 responded and collectively detailed a total of 1.8 million tons of waste. Just over half was reported as putrescible MSW; under a quarter was reported as non-putrescible MSW, which was mainly composed of C&D waste, and the remaining portion was reported as a mix of single-stream recycling, medical or hazardous waste, and other waste streams.[6] This survey indicates that around 25% of the waste managed by the respondents was managed outside of the City.

Primary Commercial Waste Generators

Private carters service customers throughout the commercial sector, such as restaurants, cafes, bodegas, grocery stores, office buildings, and retail stores. Across all commercial businesses, private carters reported a total of 1,881,335 tons collected in the latter half of 2023. Much of this total was documented as putrescible MSW—approximately 992,263 tons—and was generated in either Manhattan (35%) or Brooklyn (22.4%), with the Bronx (18.4%), Queens (18%) and Staten Island (3.6%) following behind. The boroughs that have the highest densities of office buildings, retail establishments, and restaurants, generate the largest quantities of waste. Understanding these distribution patterns helps inform waste management strategies across all five boroughs.

Gaps in Current Commercial Waste Hauling Data

Regulations adopted pursuant to Local Law 40 of 1990 require all transfer stations within New York City to submit quarterly reports detailing the volume and weight of solid waste received by material type, the geographic origin of the waste received, and destination of the solid waste after it leaves the facility. However, the origin and destination of waste is currently not consistently reported.

Periodically, DSNY issues a voluntary survey to private waste carters operating in the City, but as responses are optional, data gaps exist from a lack of responses or incomplete data reporting. If responding, carters provide the tons of waste managed, the represented waste stream, the borough of origin, and the type and location of the transfer station where the waste will be further processed or dispositioned. However, the survey has gaps in key data, such as the origin of the waste or the destination of waste after processing. These gaps in commercial waste hauling data make it difficult to document the full scope of the waste stream and its interconnectedness.

The CWZ program aims to address historical data issues that have impacted the commercial waste industry in NYC by centralizing and standardizing data reporting from carters to eliminate inconsistencies. The CWZ program also aims to collect more complex and consistent *data specific to Business and Community Engagement, Fees Collected by Carters, Costs to Dispose of Material at Transfer Stations, Vehicles Miles Traveled (VMTs), Collection Data by Waste Stream, and Enforcement from the implemented zones, which will be published in an annual report* to fully understand the operations and impact of commercial waste. These steps to improve data quality will be enforceable, and enable goals regarding environment, health and equity to be measured accurately.

The implementation of CWZs in New York City will require carters under contract with DSNY to periodically report a variety of data points, including the following:

- Customer information, such as number of customers, rates, and service details
- Routing information and other on-board vehicle software data
- Investments in vehicles, facilities, or infrastructure
- Collection and disposal data, including dump tickets, delivery receipts, and the final disposition information
- Progress toward sustainability goals
- Waste generation estimates and waste characterization studies

All contracted carters are now also required to outfit fleet vehicles with GPS devices capable of storing and transmitting geographic data. This data must be reported in real time to provide information regarding route optimization and efficiency as well as ensuring carters stay within their zone boundaries while servicing zone businesses.

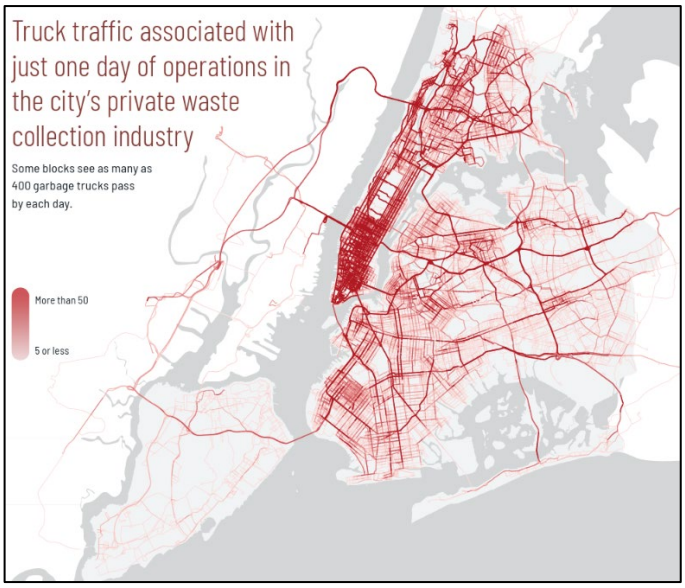
Current Hauling Routes, Practices, and Facilities

Routes

The CWZ Implementation Plan identified that the previous commercial waste management system had a total of 90 private carters operating across the five boroughs and that, within some parts of the city, "more than 50 carters service a single neighborhood." The plan also noted that an individual commercial block could see dozens of private waste collection trucks on a single day. An example highlighted a single isolated block in Manhattan that had 122 customers serviced by 26 different providers. Such inefficient operations have contributed to issues of elevated noise levels and air pollution.

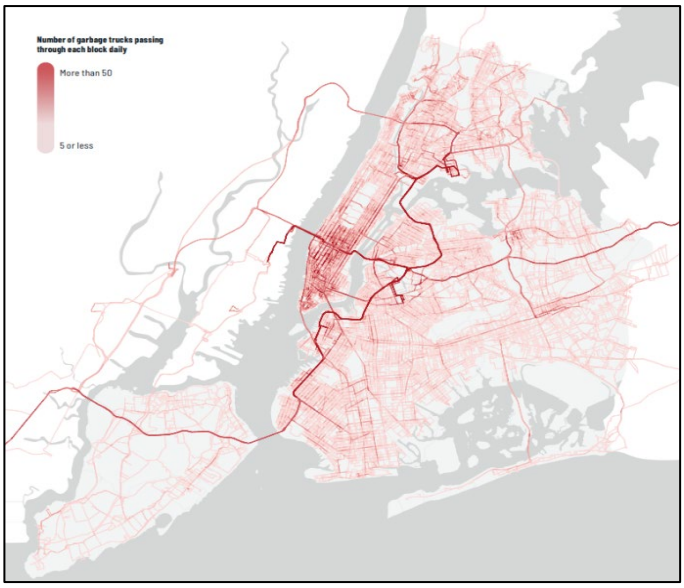
Route inefficiencies are due to carters' ability to service clients anywhere in New York City. This has negative impacts on road safety, working conditions, and access to safety equipment and practices. These issues have led to a variety of impacts, such as overlapping routes with other service providers; high levels of vehicle miles traveled by each company; low, stagnated recycling rates; and persistent safety risks to staff, drivers, city pedestrians, cyclists, and motorists. The first commercial waste zone, Queens Central, was implemented on January 3, 2025. Additional zones are scheduled for phased rollout beginning later in 2025. **Figure 1** illustrates the current conditions operations assessment for commercial waste carters; **Figure 2** illustrates a scenario of potential changes after complete implementation of all CWZs.

Figure 1. Estimated Current Commercial Waste Collection Operations



Source: *DSNY Commercial Waste Zones Implementation Plan*

Figure 2. Potential Future Commercial Waste Collection Operations Scenario



Source: *DSNY Commercial Waste Zones Implementation Plan*

Practices and Fleet

DSNY found that private carters are more likely to have older vehicle fleets, with an average truck age of 12 years old. In the CWZ Implementation Plan, DSNY identifies the "cutthroat business environment" as the driving factor that

“precludes substantial investments” toward updating and optimizing fleet infrastructure. This means that more modern engine features that control emissions of particulate matter are not in use, leading to higher levels of air pollution for residents. While companies were required to update or retrofit their fleet to at minimum be equipped with engines certified to the 2007 U.S. EPA emission standard by 2020, facilitating the implementation of infrastructure investments such as these can be difficult to convince businesses to undertake due to the high capital investment needed. As part of the CWZ RFP process, carters were required to demonstrate plans for financing fleet or facility infrastructure investments. The carter selection process included review of these plans outlining investments in infrastructure and technologies that promote program goals, including clean vehicles, safety technology, and sustainable waste management facilities. Carters who have secured awards and are operating in an implemented zone are also now required to provide the Department with an annual report regarding such investments.

Employees in the commercial waste collection industry often face dangerous working conditions and long, grueling shifts. Through Local Law 199 of 2019 and the accompanying CWZ rules, the City has established strict safety standards for both companies and workers in the commercial waste collection industry. The City will work to require carters to follow all applicable federal, state, and local labor laws. In the competitive selection process, carters were required to demonstrate a history of compliance and are subject to audits to ensure adherence to labor laws.

The lack of regulation of private waste carters has also contributed to undesirable socioeconomic and workforce impacts. Due to limited oversight, many commercial solid waste management contracts are confusing for commercial business clients, with inconsistent and opaque pricing scales. Contracts are also known to be verbally agreed upon rather than written and signed. Poor service is also frequently reported by businesses. Like opaque pricing, the level of services offered between customers can also vary. While businesses have been required to recycle by law in New York City for over 20 years, the rules and regulations surrounding that mandate have often been difficult for businesses, employees, and their customers to understand until a simplification of requirements was approved in 2016.[7]

Facilities

Private waste haulers serving commercial customers manage a wide range of waste streams, including MSW, recyclables, C&D, fill, and other specialized/industrial wastes. The MSW and recyclables collected by private commercial haulers are taken to the private transfer stations identified in **Table 2** (MSW) and **Table 3** (Recyclables). While DSNY has data on waste delivered to private transfer stations within New York City, it is also taken directly to facilities outside of New York City identified in **Table 4** (Output). Information in **Table 4,** derived from the historic Private Carter Surveys, lacks detailed data on the specific transfer stations where waste was output to. Consequently, the waste stream cannot by fully traced or accurately integrated with the data presented in **Table 2** and **Table 3**. Closing this data gap is something the CWZ program has the potential to address.

Table 2. Annual MSW Collection by Private Transfer Station in 2022 Ranked by Tonnage[8]

Facility Name*	Facility Location	MSW Collected Annual Tons
Action Environmental Systems	Bronx	340,794
Waste Management (Scott Avenue)	Brooklyn	182,408
Metropolitan Transfer Station	Bronx	145,108
Waste Connections 50th Street	Brooklyn	139,820
Action Environmental Services - Stanley Ave	Brooklyn	114,735
Waste Connections Court Street	Brooklyn	102,473
American Recycling Management LLC	Queens	101,119
Regal Recycling Inc.	Queens	93,631
Tully Environmental Inc	Queens	82,380
Hi-Tech Resource Recovery Inc	Brooklyn	68,013
Brooklyn Transfer LLC	Brooklyn	65,164
WMNY LLC Harlem River Yard	Bronx	33,256
Waste Management (Varick Avenue)	Brooklyn	14,308
Note: *Facilities are listed from those that accepted the greatest quantity of tonnage to the least in 2022.		

Table 3. Annual Recyclables Collection by Private Transfer Stations in 2022, Ranked by Tonnage[9]

Facility Name*	Facility Location	Recyclables** Collected: Annual Tons
EWG Glass Recovery and Recycle	Queens	74,334
Action Environmental Systems	Bronx	67,688
Royal Waste Services Inc	Bronx	59,168
Royal Recycling Services	Queens	57,530
Royal Waste Services Inc	Queens	51,539
EWG Glass Recovery & Recycle Corp (180th Street)	Queens	34,279
Boro-Wide Recycling	Queens	34,045
USA Recycling Inc	Brooklyn	33,459
Parallel Products of New England Inc	Bronx	30,748
GPB Waste NY DBA NY/NJ Recycling (Formerly Rapid Processing)	Queens	28,685
Metropolitan Paper Recycling	Brooklyn	28,242
Paper Fibers Corp.	Bronx	25,297
Hi Tech Holdings LLC D/B/A Scholes Street Recycling	Brooklyn	24,301
Emerson Recycling Corp	Brooklyn	10,040
Parallel Products of New England Inc	Bronx	6,309
Waste Management (Scott Avenue)	Brooklyn	3,441
Commercial Recycling Technology LLC	Queens	1,560
Action Environmental Services - Stanley Ave	Brooklyn	858
Note: * Facilities are listed from those that accept the greatest quantity of tonnage to the least in 2022. **Recyclables include single stream, source-separated recycling, paper, MGP, textiles, and others.		

Table 4. Private Carter Survey: Output Tonnages[10]

Year	Output going to NYC Transfer Stations (Tons)	Output going directly outside of NYC (Tons)	Other* (Tons)
2017	2,086,549 (53.3%)	1,243,933 (31.8%)	580,931 (14.8%)
2018	2,270,187 (58.6%)	1,062,384 (27.4%)	540,359 (13.9%)
2019	2,019,226 (58.4%)	874,500 (25.2%)	569,417 (16.4%)
2020	1,256,441 (53.3%)	656,520 (27.8%)	445,836 (18.9%)
Note: For tonnage summarized in column "Other" private carters did not report the destinations.			

Implementation of Commercial Waste Zoning

Commercial Waste Zone Framework

There are three documents that provide the framework for the CWZ program: Local Law 199 of 2019, the CWZ Rules[11], and the Awardee Agreements[12]. These documents include information such as the number of CWZ zones; how zones are distributed across the city; the competitive process for selecting carters; specific requirements for carters, such as safety standards, recycling goals, and customer service expectations; and environmental and operational goals, such as reducing truck traffic and cutting emissions. The CWZ system focuses on the collection of putrescible waste, refuse, recyclables, and organics.

Following the passage of Local Law 199 of 2019, DSNY began the RFP process for the 20 zones across the City. In January 2024, DSNY announced the awardees for each of the commercial waste zones. The awardees are a mix of small, medium, and large carter operations, and other carters may participate in the program as subcontractors of the awardees.[13]

The implementation of the CWZ program kicked off in the Queens Central zone, which includes the neighborhoods of Jackson Heights, Corona, Elmhurst, and parts of Forest Hills and Ridgewood. This zone was selected as the pilot due to the wide variety of businesses requiring service in the zone. The start of the implementation of the first zone took place in September 2024, with communications to local businesses beginning in July of 2024. As of March 2025, all known businesses in Queens Central are receiving services from a zone awardee. DSNY is tracking awardee compliance on pricing, service, and safety. The CWZ Awardee Agreements mandate a lower collection fee for all recyclables and organics.

Oversight and Management Tools

To meet increased safety, environmental, and customer service standards, DSNY has deployed a suite of new technology platforms and tracking mechanisms. All commercial waste vehicles are now required to be equipped with telematics systems, enabling precise monitoring and compliance. The Carter Portal serves as a centralized electronic repository for contracts, customer service agreements, and operational data. In addition, DSNY has developed public-facing tools, including the Find Your Zone lookup system, that provide increased transparency into zones, carter awardees for each zone and citywide contracts, and the Maximum Rate Calculator, which allow businesses and the public to identify carters that operate in their zone and compare maximum rates across carters.

Commercial Waste Zone Goals and Projections

The CWZ program requires shorter and more efficient carter routes that stay within the carters' zone boundaries. The density promoted by 20 zones also allows carters to continue to service an equal or nearly equal number of customers without leaving the awarded zone. The 20 zones were created based on existing community district and borough

boundaries and with the intention of each zone having a similar number of customers operating within their boundaries. The City has also awarded five contracts to carters applying for citywide containerization services—the management of waste disposed exclusively in large, dedicated containers that are 10 cubic yards or larger (e.g. compactors).

With these elements and requirements, the CWZ program is projected to reduce truck traffic by more than 60% by removing 12 million miles of truck traffic from New York City streets every year. Implementation of the program kicked off in September 2024 with the Queens Central zone, which became operational on January 3, 2025. DSNY is currently assessing operational performance in Queens Central while finalizing the schedule for the remaining 19 zones. Additional rollouts are expected to begin in 2025. Lessons learned from the first zone are being used to refine operational protocols, strengthen enforcement systems, and inform best practices that will guide full program deployment. **Table 5** reflects the CWZ implementation timeline as of February 2025.

Table 5. Commercial Waste Zone Implementation Timeline

Implementation Action	Date
DSNY conducts Private Carting Study to assess the existing commercial waste collection system.	2016
DSNY releases Commercial Waste Zones Implementation Plan, a blueprint for reforming the commercial waste collection system.	November 2018
Local Law 199 of 2019 is enacted, mandating the establishment of Commercial Waste Zones throughout New York City.	November 20, 2019
DSNY announces that 50 private carters submitted proposals in response to the first part of the CWZ program request for proposals.	June 2021
Queens Central zone is designated the CWZ pilot zone.	January 30, 2024
Businesses in Queens Central zone sign new contracts with authorized carters.	September 3, 2024, to January 2, 2025
Queens Central zone CWZ pilot becomes fully operational.	January 2, 2025

Private carter companies had to complete a rigorous process to be awarded a 10-year contract for conducting business in a CWZ. The new process was created to encourage private carter companies to meet CWZ Implementation Plan goals and objectives in relation to quality of services, the environment, and labor. The new process requires the provision of recycling and organics collection to all customers and the submission of a customer service plan, a waste management plan, an emergency management plan, and a health and safety plan, among other requirements.

This rigorous and competitive process holds private carter companies to a higher standard of service than previously seen in the industry before Local Law 199. DSNY has outlined the terms of compliance in each contract, including transition and post-award phases, with the intent to monitor progress towards CWZ Implementation Plan goals and objectives as the program moves forward. An important component of the post-award phase, as described in the CWZ Implementation Plan and reiterated in DSNY hearings as recently as March 2024, is mandated public education and outreach conducted by DSNY staff to aid in facilitating the transition between commercial waste modes of operation in each zone. This outreach includes modalities such as seminars, web conferences, and a multilingual education program.[14]

Commercial Waste Zone Awardees

The application and selection process opened in 2021, and DSNY awarded each of the zones to three carters, allowing both customer choice and the competitiveness that will drive market innovation. Awardees were selected

based upon the competitive scoring of their application materials during the RFP process. Following a competitive RFP process, DSNY awarded eighteen (18) carters with zone-specific contracts and five (5) carters with citywide containerized waste awards. DSNY's website summarizes the private carter awards by zone.[15]

Figure 3. Final Commercial Waste Zones

**Midtown North and Midtown South are both part of CD 105*
Source: *DSNY Notice of Adoption of Final Rule Establishing 20 Commercial Waste Zones*

2. New York City Commercial Waste Laws and Policies

The Commercial Waste Zones (CWZ) Program is codified in Title 16-B of the New York City Administrative Code and was created by Local Law 199 of 2019 (LL199). These laws, rules, and the Awardee Agreements, which are the

contracts that govern the carters' relationships with the City, represent the framework applied by the Department's Bureau of Commercial Waste to ensure the CWZ program will improve public safety, reduce truck miles traveled, and protect commercial waste customers.

Local Law 146 of 2013: Commercial Organics Law[16] requires that certain commercial businesses separate organic waste (food scraps, food-soiled paper, and compostable products). The implementation of Local Law 146 began in July 2016 with the first designation by rule, which identified the types and sizes of businesses required to comply with the law, required such businesses to source separate organic waste generated those businesses' premises, and identified options for the transport or processing of the organic waste. Since the first designation by rule, two additional designations have been issued, expanding the applicability of the law to additional establishments. While Local Law 146 of 2013 requires certain large food-related businesses to separate organics, most businesses remain outside its scope. Expanding organics separation requirements to apply to all businesses would align the commercial sector with the City's citywide residential organics mandate and ensure that the CWZ system delivers on its environmental promise. Additional information on organic waste, including this rule, is available in **Attachment E**: **Organic Waste Generation and Management in New York City**.

3. New York State Commercial Waste Laws and Policies

The State of New York has two laws directed at waste reduction from the commercial sector:

- **The Bag Waste Reduction Act:** In March of 2020, New York State's Bag Waste Reduction Act took effect. This act prohibits any place of business that is required to collect New York State sales tax from distributing plastic bags. This act also requires business establishments with certain size requirements to establish and maintain at-store recycling programs for plastic bags.
- **Expanded Polystyrene Foam Container and Polystyrene Loose Fill Packaging Ban:** Effective in January 2022, this act prohibits food service providers and stores (retail or wholesale) from selling, offering for sale, or distributing disposable food service containers that contain expended polystyrene foam in New York State. New York City is exempt from this state law, having established its own local polystyrene foam ban (Local Law 142 of 2013).

Endnotes

1 DSNY, Appendix A: The Existing Commercial Waste System – DSNY Commercial Waste Zones
2 Testimony from Oversight Hearing – Commercial Waste Zones, Committee on Sanitation and Solid Waste Management, April 23, 2025, Hearing before the New York City Council – Committee on Sanitation and Solid Waste Management on 4/23/2025 at 10:00 AM, https://www.nyc.gov/assets/dsny/downloads/about/news/testimony/2025/dsny-oversight-hearing-testimony-042325.pdf
3 New York City, Environmental Quality Review Project Search, https://a002-ceqraccess.nyc.gov/ceqr/ - CEQR # 19DOS003Y
4 Putrescible Private Transfer Station Quarterly Reports, Commercial Organics Private Transfer Station Quarterly Reports, and Recycling Processor Quarterly Reports - 2022
5 Putrescible Private Transfer Station Quarterly Reports and Recycling Processor Quarterly Reports (output tonnages, excludes residue tonnage) – 2022.
6 DSNY, Private Carter Survey Reports Q3 & Q4 2023.
7 MOCEJ, *One New York: The Plan for a Strong and Just City*, https://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf
8 DSNY, Private Transfer Station Quarterly Reports - 2022
9 DSNY, Recycling Processors Quarterly Reports - 2022
10 DSNY, Private Carter Survey - 2017, 2018, 2019, 2020
11 Notice of Adoption of Final Rule Establishing Customer Service and Operations Requirements for Commercial Waste Zones, https://rules.cityofnewyork.us/wp-content/uploads/2020/12/CWZ-Customer-Service-and-Operations-Rules-Final-clean-Nov-8-2021_Nov-9-1.pdf
12 DSNY, Commercial Waste Zones Award Agreement (template): https://www.nyc.gov/assets/dsny/downloads/businesses/cwz/cwz-template-agreement.pdf
13 Press Release: New York City Department of Sanitation Announces Key Details and Contract Awards by Zone for Implementation of Sweeping Commercial Waste Reform, Local Law 199 of 2019
14 DSNY, Public Hearing, In Re Initial Zone Rule for Commercial Waste Zones, March 25, 2024: https://www.nyc.gov/assets/dsny/downloads/about/proposed-rules/2024/dsny-proposed-rule-initial-zone-rule-for-cwz-transcript-032524.pdf
15 DSNY, Commercial Waste Zones, See the list of awardees by zone: https://www.nyc.gov/assets/dsny/downloads/businesses/cwz/cwz-awardees-by-zone.pdf
16 DSNY, New Business Organics Rules, https://www.nyc.gov/assets/dsny/docs/commercial-organics-notice-english.pdf; Commercial Organics Requirements: https://www.nyc.gov/site/dsny/businesses/materials-handling/commercial-organics-requirements.page

NYC Solid Waste Management Plan 2026

Attachment G: New York City Commercial Waste Recycling Rules

This attachment summarizes New York City commercial waste laws and regulations with a focus on diversion and disposal requirements by material to provide guidance and context for the *2026 Solid Waste Management Plan (SWMP26)*. This attachment also describes requirements specific to recent local laws, such as commercial organics recycling, plastic polystyrene single-use food containers, plastic carryout bags, single-use plastic straws, splash sticks, and stirrers. The summary was prepared in August 2025. The laws summarized are subject to change and new laws that affect commercial waste may be promulgated.

Information on relevant Local Laws is available in **Attachment A: Local Laws Relevant to Waste Management.**

Table 1. Commercial Waste Recycling Requirements and Information

Paper
Keep separate from: Metal, glass, plastic; yard waste; textiles; construction and demolition debris; solid waste; organic waste; electronic and e-waste. **May be commingled with:** Metal, glass, and plastic ***if*** materials are collected by a private carter or recycler who applies single stream collection and recycling. **Set-out and collection:** Tied and bundled securely, placed out separately for collection in transparent or translucent bags, or labeled bins.
Metal, Glass, Plastic
Keep separate from: Paper; yard waste; textiles; construction and demolition debris; solid waste; organic waste; textiles; yard waste; electronics and e-waste. **May be commingled with:** Metal; glass; plastic. Paper ***if*** materials are collected by private carters or recyclers who apply single stream collection and recycling. **Set-out and collection:** Collection in transparent or translucent bags or labeled bins. Bulk metal and bulk plastic items that do not fit in transparent or translucent bags or labeled bins may be placed out separately. **Banned/restricted products:** Polystyrene foam food containers and packaging peanuts; Plastic carryout bags (with exceptions); Single-use plastic straws, splash sticks, and stirrers
Organics
Establishments affected: See **Notes**.[1] **Keep separate from:** Paper; metal, glass, plastic; textiles; solid waste; textiles; construction and demolition debris; electronics and e-waste**.** **May be commingled with:** Yard waste – dependent on service or collection. **Set-out, collection, or management options:** Businesses have the option to arrange for collection by a private carter, transport organic waste themselves, or process the material on-site. Suitable processing methods include in-vessel composting and aerobic/anaerobic digestion. See **Notes**. Food waste grinders or food waste liquefiers (with exceptions) are not permitted.
Yard Waste
Establishments affected: Those whose solid waste during any monthly period is comprised of at least 10% yard waste. **Keep separate from:** paper; metal, glass, plastic; textiles; solid waste; construction and demolition debris; electronics and e-waste. **Set-out, collection, or management:** Placed out separately for collection. Commercial landscapers are required to dispose of yard waste at permitted composting facilities.
Textiles
Establishments affected: Those whose solid waste during any monthly period is comprised of at least 10% textiles. **Keep separate from:** Paper; metal, glass, plastic; yard waste; solid waste; organic waste; construction and demolition debris; electronics and e-waste. **Set-out and collection:** Placed out separately for collection.
Electronics and E-Waste
Establishments affected: Businesses with 50 or more full-time employees or nonprofits with 75 or more full-time employees. **Exception:** Small businesses with fewer than 50 full-time employees and nonprofits with fewer than 75 employees may be eligible for free and convenient electronics recycling provided by manufacturers. **Keep separate from:** Paper; metal, glass, plastic; yard waste; textiles; solid waste; organic waste; C&D waste. **Set-out, collection, or management options:** Businesses are encouraged to donate unwanted, but functional electronics. Check donateNYC for options. When donation is not an option, businesses are required to contract with an electronic waste recycler.
Construction and Demolition Debris
Establishments affected: Those exclusively engaged in an activity that generates construction and demolition waste during the ordinary course of business. **Keep separate from:** Paper; metal, glass, plastic; yard waste; textiles; solid waste; organic waste. **Set-out, collection and management options:** Placed out separately for collection or disposed of at construction and demolition debris handling and recovery facilities.

Table 2. Description of Recyclable Material Categories

Paper	High grade office paper, newspaper, magazines, catalogs, phone books, mixed paper, mail and envelopes, receipts, wrapping paper, soft-cover books, smooth cardboard, cardboard egg cartons and trays, pizza boxes (unsoiled), and corrugated cardboard
Metal, Glass, Plastic	Metal cans, metal items, aluminum foil, aluminum foil products, metal caps and lids, industry-specific metal (e.g., wire hangers, pots, tools, small appliances, etc.), metal components of bulk waste, bulk metal, glass bottles or jars, beverage cartons, drink boxes, aseptic packaging, rigid plastics, and bulk plastic
Organics	Food scraps, plant trimmings, food soiled paper, certified compostable products
Yard Waste	Trees, leaves, grass clippings, garden debris, and vegetative residue that is recognizable as part of a plant or vegetable, small or chipped branches, and similar material
Textiles	Fabrics, sheets, linens, clothing, rope, belts, bags, and shoes. Material may be natural or synthetic.
Electronics and E-Waste[2]	Desktop computer towers, monitors, laptops, tablets, keyboards, mice, pointing devices, printers, document scanners, cables, cords, servers, TVs, VCRs, DVD players, DVRs, cable boxes, cable/satellite receivers, antennas, digital converter boxes, e-readers, portable music devices/digital music layers, digital cameras, and cell phones
Construction and Demolition (C&D) Debris	C&D debris for the purposes of this recycling requirement excludes plaster, wall coverings, drywall, roofing shingles, particle board, wood and lumber, and glass windowpanes. These may be recycled but are not a requirement. Check with a BIC licensed C&D carter for available options.

General Notes

- The recycling requirements summarized in **Table 1** are effective as of August 1, 2016, unless otherwise indicated under material-specific notes.3 This listing is current as of April 2025.
- Businesses that set out waste on the curb are required to use bins with secure lids for refuse. If a business is required to collect organics separately, additional bins are required. Recyclables, including metal, glass, plastic, or clean paper and cardboard, do not need to be collected in bins. Bins must be able to contain waste generated in a 72-hour period. Businesses with loading dock waste collection are not required to use bins.[4] DSNY rules currently allow for commercial establishments to set out waste and recyclable materials within one hour of closing provided that the scheduled collection occurs before the establishment next reopens for business and only if such materials are placed out for collection in receptables with tight-fitting lids. Establishments that place materials out for collection in bags may place such materials at the curb no earlier that 8:00 p.m.[5]
- Professional establishments doing business in residential buildings may qualify for DSNY collection if the business meets one of the following criteria:
    1) be authorized by law to engage in an occupation in part of the home in addition to its residential use;
    2) be a licensed NYS lawyer or chiropractor or licensed NYS physician or dentist authorized to engage in an individual or group medical practice in a basement or on the first or second floor in the residential portion of the building; or
    3) be in a residential portion of residential building that has been used for occupational purposes since December 15, 1961.
- A merchant who disposes of a negligible amount of garbage or recyclable materials (less than 20 gallons over seven consecutive days) can share private carter service with one or more other merchants. Merchants sharing private carter services must be offered a written documentation by the private carter and given a free decal. For merchants sharing private carter service, the private carter should agree on a point of collection which should be at one of the merchants' establishments, and within walking distance of the other merchant(s') establishment(s). Under no circumstances can a merchant dispose of any garbage or recyclable materials in a DSNY litter basket or join with another establishment that is eligible that receives our collection service.

Organics Notes

Establishments subject to the recycling requirements:

- Food Service Establishments having at least 7,000 square feet (sf)
- Chain Food Service Establishments of at least 2 NYC locations with combined floor area 8,000 sf or more
- Food Service Establishments in Hotels having at least 100 guest rooms
- Food Service Establishments with combined floor area 8,000 sf or more in the same building or location
- Retail food Stores having at least 10,000 sf
- Chain retail food stores of 3 or more NYC locations with combined floor area 10,000 sf or more
- Food preparation locations having 6,000 square feet or more
- Catering establishments hosting on-site events to be attended by more than 100 people
- Temporary Public Events to be attended by more than 500 people
- Arenas and stadiums with a seating capacity of at least 15,000 people
- Food manufacturers that occupy a floor area of at least 25,000 sf
- Food wholesalers that occupy a floor area of at least 20,000 sf

Businesses choosing to use compostable products should first confirm that they meet their carter's or processor's specifications. Compostable plastics may be problematic as they can be indistinguishable from other plastics that must be recycled. Businesses should prioritize items that are reusable, if possible.

Recyclable organics do not include organic waste food that is donated to a third party, food that is sold to farmers for feedstock, and meat by-products that are sold to a rendering company.

All food-related businesses must also set out any putrescible solid waste, including refuse and organic waste, at the curb for private carter collection in rigid receptacles with tight-fitting lids unless collection takes place in a loading dock.[6]

Businesses that have aerobic or anaerobic digestion systems must have all such processing equipment already registered with DSNY, and the registration must be renewed annually.[7]

New York State Department of Environmental Protection (DEP) prohibits food waste liquefiers except for devices approved for use prior to 9/25/2021.[8]

Plastic – Single-Use Polystyrene Foam Food Containers

- Stores, food service establishments, and mobile food commissaries may no longer offer, sell, or possess single-use polystyrene foam food containers, including but not limited to clamshells, cups, plates, bowls, trays, and coolers. Manufacturers, distributors, and stores may not sell loose foam packaging, such as polystyrene packing peanuts as of January 2019.[9]

Plastic – Carryout Bags

- Plastic carryout bags, other than exempt bags, may not be distributed by anyone required to collect New York State sales tax as of March 2020.[10]
- Exempt bags include those used for the following purposes:
  - Contain or wrap uncooked animal products, seafood, produce, or grains, or other unwrapped or non-prepackaged food, flowers, plants, and other items for human or environmental health and safety.
  - Bulk items, including candy, small hardware items, live insects, or other aquatic items.
  - Sliced or prepared to order food.
  - Newspaper for delivery.
  - Prepackaged plastic bags for consumer purposes, such as trash bags and food storage bags.
  - Garment bags.
  - Carry out or delivery of prepared food by food service establishments.
  - Pharmacy provided bags for prescription drugs.

Plastic – Single-Use Plastic Straws, Splash Sticks, and Stirrers

- Distribution of single-use plastic straws, splash sticks, and stirrers by New York City food service establishments have been restricted as of November 2021. Single-use plastic straws may be provided to customers upon request.[11]

Commercial Waste Zones

The Commercial Waste Zones program aims to reduce truck traffic and improve the safety of commercial waste collections in New York City through the implementation of twenty collection zones, as discussed in **Attachment F: Commercial Waste in New York City**.

Endnotes

[1] New York City Department of Sanitation, Notice of Adoption of Final Rule Relating to the Expansion of Organic Waste Source Separation Requirements for Various Commercial Entities: https://dsny.cityofnewyork.us/wp-content/uploads/2020/01/Notice-of-Adoption-of-Final-Commercial-Organics-Rule.pdf.

[2] Any materials that have special collection requirements (including hazardous waste) pursuant to applicable local, state, or federal law must be disposed of accordingly, and must not be commingled with solid waste, designated recyclable materials or organic waste.

[3] New York City Department of Sanitation, Notice of Adoption of Final Rules Governing Recycling Requirements for Entities that Receive Private Carter Collection: https://dsny.cityofnewyork.us/wp-content/uploads/2017/12/DSNY-NOTICE-OF-ADOPTION-COMMERCIAL-RECYCLING-RULES-2.5.16.pdf

[4] New York City Department of Sanitation: Setout and Containers: https://www.nyc.gov/site/dsny/businesses/setup-operations/setout.page

[5] New York City Department of Sanitation, Notice of Adoption of Final Rules Relating to Use of Certain Receptacles by Commercial Establishments https://dsny.cityofnewyork.us/wp-content/uploads/2023/11/DSNY-Notice-of-Adoption-of-Amendment-of-Rules-Relating-to-Use-of-Certain-Receptacles-by-Commercial-Establishments.pdf

[6] New York City Department of Sanitation, Notice of Adoption of Final Rule Relating to Use of Certain Receptacles by Food-Related Businesses: https://rules.cityofnewyork.us/wp-content/uploads/2023/05/DSNY-Notice-of-Adoption-of-Final-Rule-Relating-to-the-Use-of-Certain-Receptacles-by-Food-Related-Businesses.pdf

[7] New York City Department of Sanitation, Commercial Organics Requirements: https://www.nyc.gov/site/dsny/businesses/materials-handling/commercial-organics-requirements.page

[8] New York City Department of Environmental Protection, Notice of Adoption of Final Rule Relating to Food Waste Liquefiers: https://rules.cityofnewyork.us/wp-content/uploads/2021/04/Food-Liquifier-Rule-for-Final-Publication.pdf

[9] New York City Council, Int 1060-2013: Restrictions on the sale or use of certain expanded polystyrene items: https://rules.cityofnewyork.us/wp-content/uploads/2021/04/Food-Liquifier-Rule-for-Final-Publication.pdf

[10] New York State Department of Environmental Protection, Plastic Bag and Film Plastics Recycling for Retailers: https://www.dec.ny.gov/chemical/50058.html

[11] New York City Council, Int 0936-2018 Version A: Restricting single-use plastic beverage straws, beverage stirrers and beverage splash sticks, and to repeal chapter 4 of title 16 of such code, relating batteries: https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3509897&GUID=6CF1706B-A393-407E-B0A6-78D253222450&Options=ID|Text|&Search=beverage+straw

NYC Solid Waste Management Plan 2026

Attachment H: Review of Advanced Thermal Treatment Technologies

Thermal treatment includes any process by which waste is transformed using high temperatures. New York City has used incineration, a well-established thermal treatment technology, since 1894, when the city built its first incinerator. However, all New York City Department of Sanitation (DSNY) and residential incinerators have been closed since the 1990s.[1]

Advanced thermal treatment (ATT) technologies use heat without combustion to process waste. These technologies include gasification and pyrolysis—the most common ATT technologies—as well as solvolysis, one of the newest ATT processes. Both established and emerging thermal treatment technologies can use the byproducts of thermal treatment for energy in the form of heat, electricity, and fuel, thereby reducing the need for energy generation from fossil fuels. Thermal treatment may also allow for the recovery of metals and other resources, post-treatment.[2]

ATT processes are still being developed, researched, and optimized. U.S. Department of Energy (U.S. DOE), National Energy and Technology Laboratory (NETL), National Research Council, and the International Panel on Climate Change (IPCC) conduct and publish research on these technologies. Additionally, the U.S. Environmental Protection Agency (EPA), National Recycling Coalition, Beyond Plastics, and International Pollutants Elimination Network Advocacy monitor advances in these technologies. EPA also regulates advanced thermal treatment facilities in the U.S. Limited independent and comprehensive peer reviewed research, along with biases from industry and environmental groups, present challenges in evaluating ATT at this time.

ATT technologies have the potential to reduce greenhouse gas (GHG) emissions associated with landfilling and incineration, and industry leaders promote plastic pyrolysis as a process that can recycle plastics. In New York State, however, most thermal treatment technologies are not classified as renewable energy sources or clean energy,[3] and many environmental organizations, such as the National Recycling Coalition (NRC), argue that thermal treatment technologies do not qualify as “recycling.”

This technical memorandum considers the limitations and opportunities of existing and emerging thermal treatment technologies and provides insight into potential avenues for New York City waste management planning that aligns with New York State climate goals. Key considerations and findings of this memorandum include the following:

- Various engineering controls can be applied to mitigate emissions and improve efficiency of energy capture through the thermal treatment of waste, though some of these controls are still being developed and optimized.
- Incineration typically releases fewer GHG emissions than landfilling,[4] and new/improved post-combustion emission reduction technologies further decrease GHG emissions from incineration. Still, incineration emits pollutants that are hazardous to humans and the environment.
- Pyrolysis and gasification are processes by which heat is applied to a system to decompose waste without combustion to generate synthetic fuels. Emissions can be controlled through refining synthetic fuels prior to their combustion, also known as precombustion emission control technology. Incineration emission can,

however, be controlled via other methods post-combustion. Other thermal treatments may be utilized in conjunction with incineration, pyrolysis, gasification, solvolysis, and landfilling.

- Gasification converts more waste to energy than incineration. Biomass pyrolysis generates bio-oil, which has potential as an alternative to conventional fossil fuels.
- While studies on the human and environmental impacts of gasification, pyrolysis, and solvolysis are limited, numerous risks have been identified, and cases of noncompliance with environmental and worker safety regulations at ATT plants have been documented.
- Industry claims that plastic pyrolysis lowers GHGs and creates a "circularity" of plastic recycling and reuse are not supported by independently verified evidence, and plastic pyrolysis facilities have not been operating at projected capacity (several have closed).

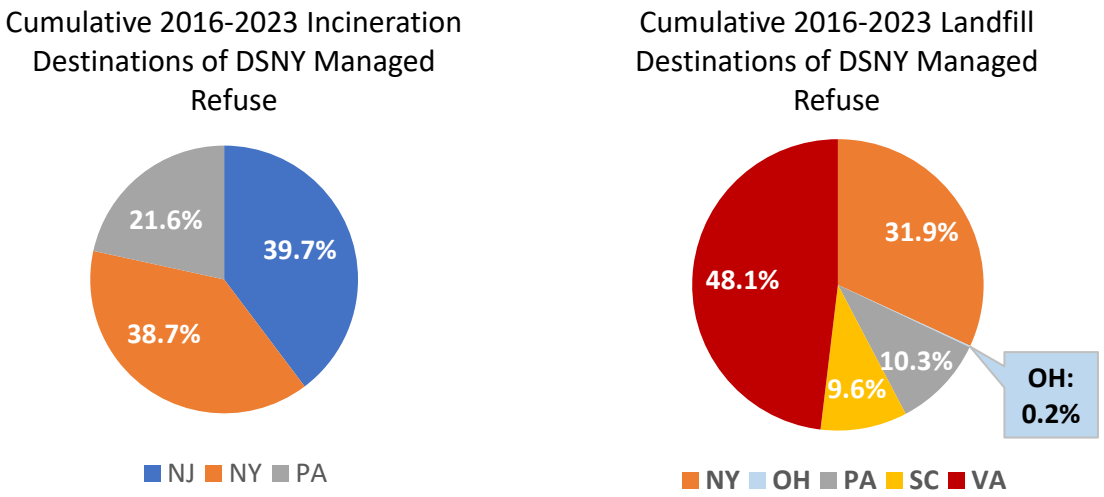
Thermal Treatment in New York City and State

In the United States and New York State, the waste management sector represents a notable portion of GHG emissions. In New York State, municipal solid waste (MSW) is primarily managed through landfilling and incineration, processes that limit the recirculation of waste materials into the economy. In 2022, waste sector GHG emissions represented 12% of the state's emissions. Of that, 86% of the state's waste emissions were attributed to landfills, 7% to the treatment of wastewater, and 7% to waste combustion. These values include emissions from waste generated in New York State but managed out of state.[5]

In 2018, the most recent year of detailed statewide data, New York State exported 17% of its total waste for management in other states.[6] Much of that comes from New York City, which exports most of its waste out of state, sending over 70% of its publicly managed refuse to Virginia, New Jersey, Pennsylvania, and South Carolina in 2023. Nearly one-third (31%) of the refuse managed by DSNY was sent to incineration facilities in 2023, and 62% of this waste was incinerated outside of New York State in New Jersey and Pennsylvania.[7] As these states develop their respective climate action plans, potentially reducing landfill and incineration capacity for imported waste, New York may benefit from considering alternative methods of managing waste. Likewise, New York State's climate action plan outlines various strategies for achieving lower GHG emissions, including a shift away from fossil fuel energy generation.[4] Waste-to-energy (WTE) technologies, including both mature and advanced thermal treatment technologies, offer a potential means of achieving that shift. WTE is defined by the United States Environmental Protection Agency (EPA) as a process by which heat, electricity, and/or fuel are recovered from non-recyclable waste.[8]

Thermal treatment technologies are limited by processing capacity, siting challenges, economic constraints, and infrastructure lifespan. In contrast, landfills are limited by space availability and siting challenges.[9] Landfill capacity for MSW in New York State is expected to be exhausted in 16 to 25 years. Landfill capacity in other Northeastern states is also depleting, and siting new landfills in the region is often legally challenged and rejected due to environmental and public health concerns. Between 2016 and 2023, DSNY sent New York City waste to landfills in New York State, New Jersey, Pennsylvania, Ohio, Kentucky, Virginia, and South Carolina and to incinerators in New York State, New Jersey, and Pennsylvania, as shown in **Figure 1**.

Figure 1. DSNY Managed Refuse



Sources: *NYC Open Data, DSNY Disposal Sites Used by Facilities by Year;*[10] *DSNY 2015-2023 Biennial Reports to DEC.*

When waste is disposed of at landfills, material is compacted and organic materials decompose in multiple phases that include both aerobic and anaerobic processes that produce GHGs. The waste is exposed to oxygen, producing nitrogen oxide emissions and carbon dioxide emissions as part of the aerobic decomposition phase, then methane and carbon dioxide as anaerobic decomposition begins.[11,12] Methane traps 28 times more heat in the atmosphere than carbon dioxide, based on a 100-year global warming potential. Methane traps even more heat short-term; the 20-year global warming potential for methane is around 81 times that of carbon dioxide.[13,14]

Landfills accounted for approximately 14.4% of methane production in the United States in 2022. Emissions from the waste sector accounted for 12% of New York State's gross GHG emissions in 2022, with landfills being the dominant source of GHGs in the sector.[6,15]

The incineration of waste produces less methane than landfilling. However, incineration does not eliminate the use of landfills, as the ash byproduct of incineration and WTE processes is sent to landfills. Still, the volume of ash is significantly lower than the initial waste feedstock—approximately 5-15%[8] of the materials input—and does not contain any remaining organic material.

Under EPA's current waste management hierarchy, which ranks waste management methods by their environmental impact, treatment and disposal methods that do not recover energy are the least preferred.[16] WTE thermal treatment technologies and landfill methane capture are the second least preferred in the hierarchy. Source reduction and reuse strategies at the top of the hierarchy have the greatest potential to reduce GHGs and pollutants related to the waste management sector. Waste material that cannot be reused or recycled should be treated and disposed of in an environmentally responsible manner, and thermal treatment technologies show promise as options for these waste streams that can help achieve climate goals.

Thermal Treatment Technologies

Of 292.4 million tons of MSW generated in the U.S. in 2018 approximately 12% (35 million tons) were combusted (incinerated), as shown in **Table 1**.[15] 8% of total waste (MSW, C&D, non-hazardous industrial, and biosolid waste) generated in New York State in 2018 was incinerated within the state. In 2018, 15% (2.7 million tons) of the 17.9 million tons of MSW generated was combusted in-state. Additional New York State waste (including New York City waste) is combusted in incinerators out-of-state. Wastes other than MSW can also be incinerated. C&D material such as concrete, gravel, and dirt are not combustible, however, approximately 1% of C&D generated in New York State is combusted (e.g., wood). New York State generated 375,000 dry tons (around 1.3 million wet tons) of biosolids[17] in 2018, 21% of which were combusted in-state.[6]

Table 1. 2018 Waste Generation and Combustion, U.S. and New York

Tons generated (millions)	Percent Combusted	Material
292.4	12%	U.S. MSW
17.9	15%	New York State MSW
0.4 (wet tons)	21%	New York State biosolids (dry tons)
Source: New York State Solid Waste Management Plan; U.S. EPA: National Overview: Facts and Figures about Materials, Waste and Recycling		

Medical waste is another type of waste that can be managed using thermal treatment. Prior to 1997, over 90% of medical waste was incinerated. Since then, EPA implemented regulations to reduce the negative effect of medical waste incinerators on air quality. Current medical waste management practices include a variety of thermal treatment options using microwave, steam sterilization, electropyrolysis, and chemical mechanical systems.[18]

While incineration is the most common method of WTE management, ATT technologies—which have the potential to produce more energy with lower pollution and GHG emissions—are on the rise. Major investments have recently been made in exploring the viability and potential uses of these technologies, as alternatives to landfilling and traditional waste incineration. While a significant source of funding for the ATT comes from private investment, public funds are also used for these operations.

Incineration, gasification, and other types of thermal treatment are discussed in greater detail, including the processes and infrastructure, feedstock, technology types, latest technology optimizations, and emissions. A discussion of the potential environmental effects (positive or negative) is also included for each thermal treatment technology listed in **Table 2**.

Table 2. Thermal Treatment Technology Types by Material and Process Environment

Technology	Materials Accepted (Feedstock)	Environment (Aerobic/ Anaerobic)
Mass Burn (Incineration)	› MSW › Industrial › C&D › Biomass	Aerobic (High oxygen availability)
Refuse Derived Fuel Systems (RDF)	Combustible MSW (non-combustible materials are separated out during pre-processing)	Aerobic
Modular Systems (Smaller than mass burn systems; movable)	MSW	Aerobic
Pyrolysis	Biomass and plastics	Anaerobic
Gasification	Carbon-based materials	Aerobic
Hydrothermal Liquefaction	Biomass (high hydration)	Anaerobic
Thermal Hydrolysis	Biosolids	Anaerobic

Incineration

Incineration is the process by which waste is combusted (oxidized or burned) to significantly reduce waste to about 5-15% of its original volume. Incineration can be further categorized by the specific technologies used: mass burn, refuse derived fuel, and modular systems. Many, but not all, incineration facilities are waste to energy (WTE) facilities, where heat from the combustion process is used to make steam, which can either be used directly for process or building heating or to power turbine generators and produce electricity.[19]

In 2022, 12.8 billion kilowatt-hours of electricity were generated by the burning of about 26.6 million tons of MSW at 63 U.S. powerplants. Approximately 12% of MSW generated in the U.S. is burned with energy recovery.[19] Incineration is more common in some parts of the world where land is scarce (making landfilling challenging). In addition to significantly reducing waste volume and allowing for energy recovery, incineration is often selected because it can process a variety of waste types.

For example, in Japan, up to 75% of MSW is incinerated for energy recovery. Denmark has Europe's highest rate of MSW burned with energy recovery, combusting up to 67% of its MSW. In places with district heating[20] such as Switzerland, as well as Denmark and other north European countries, use of heat generated through waste incineration helps to reduce the need for energy produced from fossil fuels to heat buildings.[21] New York City also has network heating (steam) infrastructure; however, the city's steam is cogenerated from gas power plants (not from waste).

In 2020, New York State had a cumulative permitted capacity to incinerate 4.2 million tons of waste per year, associated with 10 facilities in eight counties. These facilities processed 3.97 million tons of waste in 2020 (operating at close to 95% of permitted capacity) and generated 2,158 gigawatt hours (GWh) of electricity. These facilities also recovered 115,501 tons of metals and sold over 2.75 billion pounds of steam. Incineration does not completely eliminate waste and in 2020, incinerators in New York State produced 942,250 tons of residue, which is about 24% of the original waste tonnage processed. Residue, depending on its composition, can either be reused in construction materials or landfilled.[22] Information on the amounts of incinerator residue reuse and disposal is not available for New York State.

Mass burn is the most common type of WTE incineration. Mass burn systems involve minimal or no sorting of waste, though it is common for municipalities to remove recyclable material for diversion to a recycling facility prior to combustion. Waste is inserted into an oxygen-rich combustion chamber, as mass burn systems require excess oxygen to ensure all waste is combusted, especially when waste is not sorted. Oxygen is introduced by agitating waste on a sloped, vibrating, and moving grate. Combustion heats boilers that generate steam for either network heating for turbine generators that produce electricity.

Modular systems and refuse-derived fuel (RDF) systems are also frequently used. Modular systems can also incinerate MSW without pre-processing but tend to be small and portable, unlike conventional mass burn systems.[19]

RDF systems require pre-processing of MSW to remove non-combustible materials and produce a more uniform feedstock than MSW that has not been pre-processed. Feedstock composed of combustible materials and low moisture content is preferable for producing RDF.[23]

Pre-processing of MSW for RDF systems involves the separation of combustible (paper, plastics, and organics) and non-combustible (metals, glass) materials using one or more of the following technologies: shredders, pre-trommel screens, flail mills, magnetic separators, disc screens, and air classifiers. This pre-processed MSW is then further processed using mechanical (magnetic screening), thermal (heating), or biological systems (biodrying). RDF-separated feedstock may be combined with traditional fuel sources, such as coal, to produce energy at power plants. It is also possible to extract RDF in such a way that it mimics the properties of coal, allowing the RDF to then be used as fuel for boilers originally designed for coal. While RDF is commonly used in incineration, it can also be used as a feedstock for advanced thermal treatments such as pyrolysis.[19, 23]

The costs associated with incineration can be quite high due to significant capital and operating expenses, including for highly skilled workers and pollution control systems required to meet EPA and other regulations.[24]

Incinerator Feedstock (Waste Streams)

Incineration can be used to treat many waste types, including:

- MSW
- Medical waste, including collected household pharmaceuticals
- Hazardous waste
- Sludge
- Industrial waste

Technology Types

Incinerator technologies differ based on the feedstock's material state (liquid versus solid) and material type (MSW, hazardous, etc.). There are two broad categories of waste combustion units: incinerators, which primarily destroy waste feedstock but can recover energy and metals; and boilers and industrial furnaces (BIFs), which are primarily used to recover valuable materials and energy from feedstock.[25]

Waste combustion units may use one or more of the technologies shown in **Table 3**.

Table 3. Combustion Technologies

Technology	Useful for	Description
Liquid Feed Incinerator	Liquid waste, including hazardous liquid waste	This system burns waste directly by injecting liquid waste through atomizing nozzles into a combustion zone (incinerator chamber), where the waste is then burned. Some waste may require a secondary combustor. Temperatures generally range from 900 to 1,500°C.[26]
Rotary Kiln	Solid and liquid waste, including hazardous wastes	The kiln is typically at a 5-degree incline (the rake) from the horizontal plane and utilizes a refractory lining, which is a layer made of carbon or ceramic materials that is positioned between the waste that is being burned and the kiln itself. A ram or a conveyor may be used to feed solid waste into the system, while an injector is used for liquid. Some waste may require a secondary combustor.[26]
Cement Kiln	Solid and liquid waste, including hazardous waste	Feedstock is fed into a rotary kiln, where it is burned to produce cement aggregate. This system has the potential to be an economic waste treatment method that incorporates principles of recycling and recovery.[26, 27]
Lightweight Aggregate Kiln	Hazardous waste	Waste is fed into a rotary kiln, where it is burned to produce lightweight aggregate. Configuration and fueling is similar to that of the cement kiln, with different products.[28]
Fluidized-bed Incinerator	Uniformly sized solid waste, and liquid waste, including hazardous waste	A fluidized bed with sand or other inert material is used for combustion. Particles do not flow but are in suspension. Heat from this system can be captured.[26]
Halogen-acid Furnace	Hazardous waste	The system is capable of processing hazardous waste containing 20-70% chlorine or bromine. It is often a modified firetube boiler with a wet scrubber that produces a halogen-acid product. [26]

Pollution and Emissions

Incinerators emit carbon dioxide (CO_2), nitrogen oxides (NO_x), carbon monoxide (CO), ammonia (NH_3), and volatile organic compounds (VOCs). Unlike landfills, incineration under normal operating conditions does not emit large amounts of methane.[24] Despite this, the incineration of waste, and plastic in particular, generates GHG emissions due to the high amount of energy required to incinerate plastics as well as the emissions generated via combustion. In 2015, emissions from plastic incineration in the U.S. were roughly equivalent to the combustion of over half a billion gallons of gasoline, the annual emissions of 1.26 million passenger vehicles.

Incineration also emits hazardous pollutants, such as dioxin, furan, mercury, lead, cadmium, and heavy metals. EPA established emission limits for incineration facilities in New Source Performance Standards (NSPS) and emission guidelines for existing sources.[29] States and local governments may set more stringent requirements than federal requirements via legislation or operating permit requirements.[30] In 2019, approximately 4.4 million Americans resided within three miles of an incinerator. Additionally, 79% of waste incinerators in the United States are located in lower-income communities of color.[31, 32]

Requirements set forth by EPA mandate that incineration facilities demonstrate the destruction of 99.99% of harmful chemicals present in waste feedstock and 99.9999% when the waste feedstock contains extremely harmful

chemicals. Ash residue resulting from this process, much smaller in volume compared to initial waste feedstock, must be disposed of in a landfill designated for hazardous waste.[30]

Incineration facilities must also use air pollution control systems, such as:[33]

- Afterburners, which reduce CO emissions
- Scrubbers, which reduce particulates and acid gases
- Filters, which reduce particulates and can include:
  - Electrostatic precipitators
  - Cyclones
  - Baghouses
- Dry sorbent injection, which controls acid gas emissions

The amount of toxins released through incinerator exhaust can be reduced by improving combustion efficiency using RDF feedstock or equipment that supports a uniform distribution of oxygen among all waste in the combustion chamber. Emissions from incineration are harder to control or contain than ATT emissions since incineration feedstock tends to be less uniform in composition, resulting in a large volume of pollutants diluted in an even larger volume of exhaust.

Exhaust gas volume is also dependent on the type of waste and determines the quantity of pollutants that are emitted by the WTE process. One case study conducted in Germany examined sewage, hazardous, and MSW streams and determined that sewage sludge produces the highest exhaust gas volume (8,000 m^3/t of waste), followed by hazardous waste incineration (7,000 m^3/t of waste), then MSW incineration (5,500 m^3/t of waste). These differences can be attributed to the different processes and composition of waste streams.[24]

While the U.S. has used incineration to manage waste since 1885, novel technological advancements in emission control are still emerging, with innovation accelerating as governments across the world demand action against air pollution. One notable emerging technology includes SOLVAir Flue Gas Treatment, a flue gas treatment system that has the potential to remove more air pollutants from incineration exhaust than traditional wet scrubbing. This system uses a dry sorbent injection with pre-milled sodium bicarbonate. This technology is used at the Horgen Waste to Energy plant in Switzerland, as well as in the Germany, Italy, France, United Arab Emirates, and Canada and in European wastewater WTE plants.[34] Switzerland further requires the recycling of flue gas treatment residue into useful products.

Outputs

While incineration oxidizes waste to significantly reduce its volume, the process does still result in ash that cannot be further incinerated and must be either recycled or landfilled. There are two types of ash that are generated: fly ash, which are particles that were removed or scrubbed out of the flue gas and would have otherwise been emitted into the atmosphere, and bottom ash, which settles at the bottom of the system. Fly and bottom ash may be considered hazardous waste depending on the concentration of heavy metals and other compounds that have the potential to leach into water and soil. The portion of heavy metals that appear in fly ash, bottom ash, or gaseous emissions depends on feedstock and incinerator operating temperatures.[30,35] To manage these hazards, fly and bottom ash are typically integrated into cement and other solid building materials if reused.[36]

Gasification

Gasification has been used for power generation from coal for some time, first becoming pertinent in the U.S. during the energy crises of the 1970s. Popular coal-based power methods of the time produced significantly greater emissions with less energy efficiency than integrated gasification combined cycle (IGCC) power plants (combining coal gasifiers and turbines to gasify coal and generate electricity in an integrated system). An alternative to IGCC power generation, which is better suited when fuel composition is variable, is a standard Rankine cycle boiler designed to operate using syngas produced by a standalone gasifier.[37,38] While gasification has traditionally been used with coal, coal byproducts, and biomass as feedstock for power and steam generation, waste, including MSW, can also be gasified.[39,40]

Gasification is the process by which carbon-based materials are converted into synthetic fuel gas (syngas). Gasification occurs when oxygen and steam are pumped into a high-temperature and pressure vessel known as a gasifier to partially oxidize carbon-based feedstock, transforming it into syngas. Once syngas is generated from the gasification process, Fischer-Tropsch synthesis can be used to produce transportation fuels, providing an alternative to fossil fuels. Tar and mineral residues including ash, slag, and char are deposited during the gasification process. Steam produced as part of the process can be used to generate electricity. While in some ways similar to incineration and pyrolysis, gasification is a different process. Unlike incineration, gasification does not involve combustion; unlike pyrolysis, gasification does involve oxygen.[41] Syngas is comprised of CO_2, CO, hydrogen (H_2), and light hydrocarbons such as methane (CH_4), as well as small amounts of sulfur compounds, ammonia, and other contaminants. The chemical makeup of syngas depends on the composition of the feedstock gasified.

Gasification has the potential to emit less pollution than incineration. According to the National Energy Technology Laboratory, “Clean hydrogen produced by gasification is expected to contribute to the wide-ranging decarbonization of power generation and industry sectors needed to meet [climate] goals.”[42] Additionally, the capture of carbon dioxide during syngas refinement helps control its emission. Carbon dioxide can then be either sequestered or beneficially used. Syngas can be used to make gasoline and diesel as well as ammonia and fertilizer. Unlike incineration, which creates electricity without a reliable method of pollution control until after combustion has occurred, syngas can be refined and cleaned prior to its combustion for more control over emissions and environmental impacts.[43,44]

Feedstock (Waste)

The efficiency of gasification is highly contingent on feedstock composition. Gasification has traditionally utilized coal, coal byproducts, and biomass as feedstock for power and steam generation. However, waste, including biomass and MSW, can also be gasified into syngas fuel.[45] Biomass and MSW are less uniform than traditional gasification feedstocks (coal) and have higher moisture contents and lower heating values by volume.[46]

Waste streams that are suitable for gasification include:[46]

› RDFs converted from:

- MSW (excluding metal and glass)
- Textiles
- Plastic (all types)
- Rubber, including old tires
- Industrial waste
- Commercial waste

› Biomass, including:

- Forest residue, which typically includes grass and fibrous structural plant parts, such as stems and leaves; forestry byproducts; industry wood
- Sewage sludge

Each year, approximately 290 million tons of biomass from agriculture and forestry sectors are used to produce energy in the United States. In a mature market, it is estimated that the U.S. could produce 1.1 to 1.5 billion tons of biomass annually.[47]

Technology Types

› **Fluidized Bed Reactors:** Syngas production in fluidized bed reactors takes longer than in other gasification systems but yields higher carbon conversion. Fluidized bed reactors have two main configurations: bubbling and circulating. Only bubbling reactors have been demonstrated as appropriate for waste feedstock and are the most common gasification technology. Gasification in bubbling reactors happens in two steps. First, bubbling in the fluidized bed chamber generates syngas from solid waste. Then, the solid material is dragged by the induction of higher gas speed. A cyclone separates the particles and circulates them in the fluidized bed chamber.[48, 49]

› **Bubbling Fluidized Bed Gasifiers**: This technology uses various biomass feedstocks and are distinguished by their relatively dense beds, low fluidization velocities, smaller height, and larger cross section as compared to other gasifiers. Small biomass particles are suspended in oxygen-rich gas to become fluidized while constant mixing maintains a steady, moderately high temperature for an efficient, uniform reaction. Preprocessing of feedstock may be required under this system, including drying or compression.[49]

› **Fixed (Moving) Bed Gasifiers:** This technology is among the simplest gasifiers. Raw material (waste) enters the system through the top of reactor and slowly moves through a dry ash moving bed, reacting with oxygen that has been introduced through the bottom of the system. Feedstock requires low moisture, which limits applicable waste streams but still enables MSW to be gasified into fuel as fixed bed gasifiers can handle heterogeneous feedstock.[50]

› **Plasma Gasification:** This technology uses plasma to vaporize waste at temperatures of up to 10,000 K to break feedstock into syngas. Waste is fed through the side of the reactor, with the plasma torch at the bottom of the reactor. Syngas is then captured from the top of the reactor. This process requires a lot of energy, making it disadvantageous compared to other gasification reactors. However, it produces more than enough syngas to operate the process itself. A 2022 study published in the journal *Biomass Conversion and Biorefinery* examined the use of plasma gasification for the management of COVID-19-related medical waste. The results suggest that plasma gasification technology is efficient for treating biomedical waste because it can break down most biomedical compounds present in waste.[49,51,52,53]

› **Entrained Flow Reactors:** This system has shown the greatest success at large scale energy generation facilities (more than 250 MW). Feedstock particles are very finely ground (to less than 100 microns), operating temperatures are extremely high (more than 2,000 °F), and pure oxygen (as opposed to air) is used as part of the gaseous medium in which the finely ground waste feedstock particles are suspended, or “entrained.” Pure oxygen is inserted into the entrained flow reactors through a process called “oxygen-blowing.” Feedstock particles flow through a gaseous, high-velocity, oxygenated medium, acting fluid-like, and thereby attaining a uniform temperature distribution as well as uniform reaction rates. The velocity and turbulence of the oxygen

flow aids in the combustion of feedstock and typically results in a higher gross power output. Unlike other gasifiers, entrained flow reactors are capable of gasifying virtually any feedstock and can also operate on smaller scales, providing versatility and yielding almost no tar in the syngas produced. Due to oxygen-blowing, no nitrogen from air is present in the syngas products. Entrained flow reactors' success with large scale energy generation has been demonstrated at large-scale plants, where these reactors are a leading technology.[37]

Pollution and Emissions

Unlike incineration, gasification can use pre-combustion emission control technologies, which can be economically beneficial compared to post-combustion removal.[54,55]

Higher concentrations of pollutants are present in syngas compared to combustion flue gas. Gas produced by gasification is denser than gas produced by combustion, so smaller volumes of gas must be treated. The pollution control for gasifiers tends to be more efficient than that of traditional incinerators since it is easier to remove pollutants from smaller volumes of gas with high concentrations of pollutants. Additionally, the higher pressures and temperatures used in gasification allow for easier removal of CO_2 than traditional combustion. The success of pollutant removal technologies is contingent on facility-specific design features.

For example, CO_2 can be more easily captured and stored for repurposing for industrial use. CO_2 capture can use membranes and cryogenic processes, as well as absorption processes, which use solvents, or adsorption processes, which use sorbents. Pre-combustion CO_2 capture has the highest success for gasification processes that are oxygen-blown and are under high pressure.[55] H_2S is present in higher quantities in syngas than in incinerator exhaust. Much like CO_2, it is easier to remove H_2S from syngas than it is to remove SO_2 from the exhaust generated by the combustion of syngas since the pollutants are more concentrated pre-combustion.[55]

Because feedstock is carefully controlled prior to gasification, particulate matter and heavy metals are also present in much lower concentrations in gasification emissions than they are in mass burn system emissions. Nitrogen is also less present in gasification reactions than traditional combustion, where ambient air is used as a reactant, producing fewer NO_X emissions. In addition, techniques can be applied to syngas produced from waste to remove acid gases, including through chemical, physical, and mixed (chemical/physical) solvents.[55]

Pre-Combustion Control Technologies

One of the ways in which syngas can be cleaned up prior to combustion is via pre-combustion carbon capture technologies. U.S. DOE estimates that the cost of commercially available pre-combustion carbon capture technologies is approximately $60/metric ton of CO_2 generated by IGCC and typically uses either physical or chemical processes for absorption. Catalysis is an example of a chemical process that can convert CO_2 gas into useful fuels to be used in place of fossil fuels. Researchers at Pacific Northwest National Laboratory, have suggested that the conversion of captured CO_2 to useful products may be one of the most cost-effective methods of reducing carbon emissions from fossil fuel power plants. While this science is still emerging, the viability of converting CO_2 into useful fuel has been proven and may serve as a useful means of reducing the climate impact of many WTE technologies and waste management as a whole.[56,57]

CO_2 can also be captured and stored or sequestered. While this process does not allow for the conversion of carbon into useful resources, it does prevent it from contributing to climate change. CO_2 can be injected into the earth in large volumes, as has been done by large commercial scale operations at the Sleipner CO_2 Storage Site in Norway and the Weyburn-Midale CO_2 Project storage site in Canada. In the New York area, the Newark Rift Basin represents an area of interest for potential large-scale permanent CO_2 storage.[58,59]

Byproducts of Gasification

Ash, slag, and char are some of the solid waste byproducts of gasification. Much of what is known about the byproducts of gasification is based on the gasification of coal. Slag is usually made up of silica-based materials and carbon char and is black and glassy in appearance. Slag is a byproduct of gasification when the gasifier operates at a temperature that's greater than the ash fusion temperature, which causes ash to fuse together, forming a fluid and then solid mass. Unlike ash, toxic materials embedded in slag are non-leachable (toxic substances are not released when water passes through the slag) and are therefore classified as being non-hazardous. The non-hazardous classification allows slag to be repurposed for beneficial uses, such as cement production. Mercury and other volatile metals are not typically recovered from slag. They can, however, be removed from syngas that is produced, further mitigating leachable toxins of the ash, slag, and char.[60,61]

Char is composed of unreacted carbon with various amounts of siliceous ash. Char can be recycled back into the gasifier or used as an absorbent for emissions control. Studies have demonstrated the ability of char to absorb mercury and NO_x emissions. Char can therefore be used in plant operations to improve economic margins by reducing costs associated with char disposal and as a pollution control technology.[60,61]

Tar formation can occur during the gasification of biogenic feedstocks. This is typical with fluidized bed gasifiers that operate at less than 1,000°C but also occurs with other gasifiers.[62] Tar formation poses a unique challenge by complicating the downstream processing of syngas and potentially exacerbating process train downtime.

Pyrolysis

Pyrolysis is the process of thermally degrading organic compounds in the absence of oxygen (anaerobic environment) under high temperature conditions (at or above 500 °C for biomass) to produce bio-oil, syngas, and char. The initial pyrolysis process generates gases and char. Much of the gas can be condensed into liquid pyrolysis oil (also known as bio-oil in cases of biomass feedstock), with syngas (in this case CO_2, CO, H_2, and light hydrocarbons) remaining. Both syngas and pyrolysis oil can be used for energy production.[63]

Pyrolysis is primarily used for biomass, but is becoming more commonly used for plastic waste, with proponents presenting it as an approach to reclaiming hard-to-recycle plastics and addressing the low recycling rate of plastics in the U.S. There are three primary methods of pyrolysis: conventional/slow pyrolysis, fast pyrolysis, and ultra-fast/flash pyrolysis. Slow pyrolysis heats material slowly up to 500°C. Fast pyrolysis uses a quicker heating rate and higher temperatures, up to 650°C. Ultra-fast/flash pyrolysis heats material at a rate of over 500°C/second up to 1,000°C, maximizes the amount of gas produced, and does not produce char. All three produce bio-oil and gases, while slow and fast pyrolysis processes also produce char.[64]

Feedstock (Waste Streams)

› Biomass, including but not limited to:[64]

- Agricultural and forestry residues
- Animal waste

› Plastic
› Co-pyrolysis: A combination of biomass and plastic waste

Pyrolysis Processes by Feedstock Type

Biomass pyrolysis involves pyrolyzing organic material, such as biosolids and waste from industrial and agricultural processes. This process typically occurs at temperatures of at least 500°C. Similar to plastic pyrolysis, the products of biomass pyrolysis include a liquid (bio-oil), solid (biochar), and gas (syngas). The quality and proportion of each material varies depending on the temperatures and feedstocks input for pyrolysis.

Bio-oil can be used as boiler fuel or processed further to create an alternative to fossil fuels such as gasoline and diesel. Biochar is absorbent, increasing the ability of the soil to retain water and nutrients as well as reduce erosion. Biochar may be used as a soil amendment to increase carbon sequestration or to reduce heavy metal accumulation in water.[64,65,66]

Plastic waste pyrolysis is often referred to by industry as "chemical recycling" or "advanced recycling," even when pyrolysis oil is not utilized to create new plastic products. Many pyrolysis facilities produce fuel to burn for energy.[67] Syngas produced by plastic pyrolysis can be further refined into ethanol and hydrogen.[68] In certain cases, plastic pyrolysis oil can also be used as a building block for new plastics. However, as reported in a 2025 ProPublica article, typically only between 10-20% of the plastic is recycled into propylene and ethylene, two common building blocks for creating new plastic.[69] Because these building blocks are often contaminated, products made from pyrolysis typically contain less than 10% of recycled material, and often less than 5%. The industry practice of "mass balance" accounting allows manufacturers to claim much higher percentages of recycled material.[69] More research is needed to evaluate the large-scale viability for pyrolysis to minimize or replace virgin plastic products.[70]

Co-pyrolysis combines biomass and plastic pyrolysis. Compared to biomass pyrolysis or plastic pyrolysis, co-pyrolysis offers enhanced yield and quality of pyrolysis oil and syngas and reduced hydrogen consumption in the treatment of bio-oil.[68]

Technology Types

- **Fluidized-bed Pyrolyzer:** The most common type of pyrolyzer, this technology can process both biomass and plastic feedstocks. These systems have a high yield of bio-oils, are relatively easy to scale and moderately complex to set up. They typically have high operating costs, and include two main types:[64]
  - **With Circulating Heat Carrier:** This system utilizes medium-sized particle feeds and requires a large amount of sand as a heat carrier. It is more difficult to operate compared to other fluidized bed pyrolyzers. Feed enters the bottom of the system into a fluidized bed.
  - **With Electrostatic Precipitator:** Feed and carrier gas enter the system, which is then sent to a cyclone unit to remove ash and char. The gas is then quenched (rapidly cooled) into bio-oil. Waste that cannot become bio-oil may be burned.
- **Rotating Cone Pyrolyzer:** This system is compact and easy to set up, but it is difficult to scale given its size. Fine particle feed also limits the use of this system and may increase operating costs. Biomass feedstock can be processed with this technology. Feed enters the system through the bottom and as the system rotates, ash, char, and gases exit through the top of the system.[64]
- **Auger Pyrolyzer:** This system is compact and easy to set up and operate but may have limited applications. It is difficult to scale because of limitations with heat transfer, as it operates at a lower temperature than other pyrolyzers. It also has a lower yield of syngas and higher yield of char. This system operates as a long tube with feed entering the auger on one side and product exiting on the other. Biomass, plastic, and a combination of biomass and plastic feedstocks can be used with this technology.[64]

In its May 2025 policy statement on chemical recycling, the National Recycling Coalition (NRC) stated that it does not recognize plastic pyrolysis as a form of recycling as the technology does not reduce plastic pollution and facilities harm humans, the environment, and the climate.[71] EPA, NRC, Beyond Plastics, and International Pollutants Elimination Network are among the organizations monitoring this technology.

Pollution and Emissions

Plastic Pyrolysis

Due to the novelty of commercial-scale post-use plastics (PUP) pyrolysis facilities, much is still unknown about the GHG and air pollutant emissions from PUP pyrolysis. Argonne National Laboratory published an article in 2023, which assessed life-cycle GHG emissions when PUP pyrolysis oil is used as a building block for low-density polyethylene (LDPE) and high-density polyethylene (HDPE). The study is the first to analyze multiple U.S. facilities that generate new plastics using PUP waste streams. The results show an 18-23% decrease in life cycle GHG emissions in plastics feedstock containing 5% PUP-derived pyrolysis oil compared to 100% crude oil-derived LDPE and HDPE. However, plastics feedstock comprised of 20% pyrolysis oil saw only a 3-4% reduction in life cycle GHGs, as an extra step—dechlorination—is required to remove chlorine at a 20% plastics feedstock concentration.[72] Further, the GHG reduction reported in this study occurs only when compared to a waste management process with high GHG emissions.

While pyrolysis can technically be implemented for the treatment of plastic waste, the products of such a process ultimately create a hazardous waste problem. Pyrolysis often has low yields; up to 80% of plastic feedstock is lost as process fuel, emissions, or becomes hazardous waste. Many notable plastic recycling facilities that utilize pyrolysis or other forms of chemical recycling are classified as large quantity hazardous waste generators or are part of a larger facility that is classified as a hazardous waste generator. Further, according to a 2023 Beyond Plastics report, the majority of the plastic pyrolysis facilities are located in environmental justice communities.[73]

The Regenyx Chemical Recycling facility in Oregon closed in 2024 due to low output and other factors. It was categorized as a small-scale facility but was classified as a large-quantity hazardous waste generator. The facility generated one ton of hazardous waste for every three tons of processed waste. This facility was also classified as a "minor source" of air pollution by the Oregon Department of Environmental Quality.[73]

The Alterra facility in Akron, Ohio, produced two tons of hazardous waste in just one week of operation during 2018. Over 86 tons of hazardous waste was generated by this facility between 2019 and 2022. Permits further indicate that up to 17,000 tons of GHGs may emitted by this facility annually, along with 18.6 tons of nitrogen oxides, 7.8 tons of volatile organic compounds (VOCs), 5.6 tons of CO, 0.4 tons of sulfur dioxide, and 0.3 tons of other hazardous air pollutants. Records indicate that even below operating capacity, this facility came close to exceeding the limitations set forth by air emissions permits, challenging the efficiency of these operations.[73]

Alongside the other risks of plastics pyrolysis emissions and hazardous waste generation, some monomers used to create plastic polymers are also toxic to humans, including acrylonitrile, vinyl chloride, formaldehyde, and bisphenol A. These monomers act as carcinogens, hormone disrupters, or toxic agents that can impact human health.[74]

Biosolids Pyrolysis

Biosolids are a byproduct of wastewater treatment, and are distinct from other biomass materials, such as leaf and yard waste, woody biomass, and food scraps. Biosolids can contain perfluoroalkyl and polyfluoroalkyl substances (PFAS). PFAS are long-lasting chemicals that are widespread in the environment. They are found in a variety of

commercial and industrial products, and this class of contaminants can now be found in water, air, soil, and organisms, including in the human brain.[75] PFAS pose health impacts, including endocrine disruption and carcinogenicity, amongst others, and environmental concerns, including persistence in water and bioaccumulation in flora and fauna.[76,77] Therefore, the application of biosolids with PFAS as fertilizer is problematic and cause for additional research. Preliminary research suggests that biomass pyrolysis could be a viable and scalable treatment to remove or eliminate PFAS found in biosolids because the processing temperature and heating rate increase the quantity of PFAS removed from biosolids. However, this potential solution to PFAS needs to be further evaluated for safety and environmental and health impact.[78]

Emerging Thermal Treatment Technologies

While incineration, gasification, and pyrolysis remain the primary thermal treatment technologies in use, several emerging thermal treatment technologies show potential for waste management that may reduce health and environmental impacts compared to more established technologies.

Hydrothermal Liquefaction

Hydrothermal liquefaction is the process of converting biomass feedstocks with high-water content to biofuels and other industrial chemicals using water, catalysts, and a combination of high temperature (240-380 °C) and high pressure (5-30 MPa) in an anaerobic environment. Since hydrothermal liquefaction uses water as a medium, it is more efficient than pyrolysis for converting biomass with a high water content to bio-oil because the water already in the reactants can be used by the process.[79,80]

Solvents are paramount to breaking down biomass feedstocks, and common solvents include subcritical water and ethanol. This process produces tar as well as a watery phase containing biochemicals that can also be used as solvents if they are recycled back into the system. While hydrothermal liquefaction is similar to pyrolysis in terms of reactions, the bio-crude product of hydrothermal liquefaction has a much lower oxygen content and yields more hydrocarbons, resulting in a higher energy density and flowability relative to pyrolysis oil. Unlike pyrolysis, hydrothermal liquefaction uses wet feedstock, eliminating the drying stage of pyrolysis and making it more suitable for feedstocks such as sewage sludge.[81] The products of hydrothermal liquefaction could potentially be used as fuels.

Solvolysis

This type of treatment is considered a form chemical recycling in the presence of heat. Plastic waste is washed, dried, and shredded before it is immersed in a solvent, where it can be depolymerized or purified into monomers under high temperature and pressure conditions. Depending on the solvent, the process may be referred to by a different name, for example, glycolysis, methanolysis, hydrolysis, and aminolysis. This process produces monomers, oligomers, and other intermediaries, which may be used to produce the original polymer or other chemical products.[73]

Waste Drying (Heat Drying/Thermal Drying):

Useful for organic waste and other moisture-heavy waste streams, this process involves applying heat to remove water content from waste streams. When treating wastewater, this process is uniquely suitable for producing Class A biosolids, which are defined as “biosolids that have met ‘the highest quality’ pathogen reduction requirements confirmed by analytical testing and/or the use of a Process to Further Reduce Pathogens (PFRP).” The pellets

generated by this process (using wastewater as raw material) can be used residentially as well as in agricultural applications.[82] For example, both radiative-convective drying and active (forced) indirect solar dryers (AISD) can be used to convert food waste into animal feed, with AISD-processed waste found to retain significant nutritional value.[83]

Thermal Hydrolysis

Thermal hydrolysis has gained traction in the past two decades as a way to optimize wastewater treatment.[84] The process uses water, heat, and pressure to break down organic matter and is used as a pre-treatment method for the anaerobic digestion of sewage sludge. Thermal hydrolysis reduces the volume of material, kills microorganisms, and increases biogas production during digestion.

Thermal hydrolysis can be used during the wastewater treatment process right before sewage sludge undergoes anaerobic digestion. Heat up to 200°C and pressure up to 25 bar applied to the organic matter break down cell membranes, thereby optimizing the anaerobic digestion process by boosting available nutrients for the digester microbes. There are four main stages of the thermal hydrolysis process: heating, reacting, depressurizing, and cooling. Thermal hydrolysis induces the rupturing of the cell membranes via two mechanisms: heat applied, and shear force that occurs with a sudden pressure drop in the system. The sudden pressure drop also improves the water solubility and biodegradability of the sewage sludge.[85]

Thermal hydrolysis can optimize wastewater treatment by improving the dewaterability of sewage sludge, removing pathogens from sludge prior to its conversion into biosolids, and reducing volume of anaerobic digester outputs by enhancing the biodegradability of the sludge.[85]

Policy and Regulations

New York State Climate and Energy Policy

Although federal policies are in flux with regards to climate goals, state goals provide relevant guidance for the development of waste management policies. In the 2019 New York Climate Leadership and Community Protection Act (CLCPA), also referred to as the Climate Act, New York State outlines climate goals to be achieved by 2030 and 2050.[4] CLCPA Section 7 states that when "considering and issuing permits, licenses, and other administrative approvals and decisions, including but not limited to the execution of grants, loans, and contracts, all state agencies, offices, authorities, and divisions shall consider whether such decisions are inconsistent with or will interfere with the attainment of the [CLCPA's] statewide greenhouse gas emissions limits."

To achieve these goals, the Climate Act requires the State to increase its renewable energy portfolio and integrate performance standards into permits, including permits for solid waste management facilities. By 2030, 70% of the state's electricity must come from renewable energy sources to achieve 100% zero-emissions electricity by 2040, and by 2050, climate goals require an 85% reduction in GHG emission from 1990 levels.[86] The New York State Energy Research and Development Authority (NYSERDA) notes that, in support of the Climate Act, the use of biofuels and waste-derived fuels in hard-to-electrify sectors is being studied and evaluated. These sectors include aviation, maritime, long-haul trucking, and some industrial uses.[87]

Strategies to reduce emissions and environmental burdens on disadvantaged communities from the waste sector include waste reduction, reuse, and recycling initiatives; increased use of biogas; and reduced fugitive emissions and co-pollutants from waste management and wastewater resource recovery facilities. The *New York State Climate Action Council Scoping Plan* notes that New York State does not envision additional combustion facilities as part of

CLCPA initiatives but expects to maintain capacity at existing facilities to manage waste that cannot be reused or recycled. CLCPA emissions reductions are now integrated into New York State's permitting process; per Division of Air Resources (DAR)-21[88] (issued December 2022), projects that require a permit or significant permit modification must provide an objective analysis of their GHG emissions, including upstream and downstream emissions.

Currently, New York State buildings account for 32% of the state's GHG emissions and are primarily heated via the on-site combustion of fossil fuels via a one building, one energy source system.[89] In 2022, New York State enacted the "Utility Thermal Energy Network Jobs Act" (UTENJA), which follows 12 other U.S. states in establishing underground thermal energy network infrastructure, also known as district heating.[90,91] can use heat generated from processes such as waste incineration to supply heat to citizens via underground hot water pipe systems (New York City uses team produced from electricity generation; however the electricity and steam are *not* produced using solid waste).[92] NYSERDA defines thermal energy networks as using "a network of pipes to connect multiple buildings together for space heating, cooling, and domestic hot water." As part of UTENJA, NYSERDA is coordinating with local governments for participation in a thermal energy network feasibility study. Heat networks such as those used in other countries are viable alternatives to boilers for heating large buildings and can help reduce GHG emissions by using waste heat from already necessary processes, thereby reducing the need to burn fossil fuels.[93] This technology can help New York reduce strain on the electrical grid while mitigating GHG emissions and creating jobs in the sustainable energy sector, in line with CLCPA goals.

Thermal energy networks are already being used. In Copenhagen, where landfilling is banned, the entire city relies on district heating. The Amagar Bakke WTE plant in Copenhagen incinerates approximately 10% of all Denmark's waste (560,000 tons/year) annually to provide both heat and electricity to the people of Copenhagen.[94]

New York State is also part of a Regional Greenhouse Gas Initiative (RGGI) with other Northeastern states. The initiative aims to reduce power sector emissions by requiring regulated power plants to obtain allowances for carbon dioxide emissions at auctions. Auction proceeds are invested in decarbonization and energy efficiency efforts.[95] Cap-and-Invest is a joint venture between New York State Department of Environmental Conservation (DEC) and NYSERDA that would set a definitive limit on the amount of GHG pollution that can legally be emitted within the state of New York. The policy would follow a similar model to RGGI, requiring corporations to obtain allowances for CO_2 emissions. Each year the cap (total statewide amount of emissions) is lowered, with targets of a 40% reduction by 2030, and at least an 85% reduction of GHG emissions from their 1990 levels by 2050. The policy was intended to go into effect in 2025 but was delayed. In 2025, DEC began establishing a mandatory GHG reporting program in 6 NYCRR Part 253. This amendment would contribute to the gathering of information regarding sources of air pollutant emissions and support the reduction of emissions in alignment with the CLCPA. As of September 2025, the public comment period is closed, and DEC is working to address comments.[96]

New York State's Clean Energy Standard (CES) was established in 2016 and updated in 2020 to meet the requirements of the Climate Act and align with its goal of 70% renewable energy by 2030.[3] WTE is not identified as a renewable source of energy by New York State. New York's Public Safety Law §66-p(1)(b), "Establishment of a renewable energy program," defines renewable energy systems as the following:

> Systems that generate electricity or thermal energy through use of the following technologies: solar thermal, photovoltaics, on land and offshore wind, hydroelectric, geothermal electric, geothermal ground source heat, tidal energy, wave energy, ocean thermal, and fuel cells which do not utilize a fossil fuel resource in the process of generating electricity.[97]

However, NYSERDA noted in its *2023 Clean Energy Standard Annual Progress Report*[98] that "All renewable energy consumed by end-use customers in the State contributes to the CES, including energy supported by past, present, and future State renewable energy policies." These policies include:

- Renewable Energy Standard
- Renewable Portfolio Standard
- NY-Sun Initiative
- Clean Energy Fund
- Value of Distributed Energy Resources
- Offshore Wind
- Renewable energy procurements by Long Island Power Authority (LIPA) and New York Power Authority (NYPA)
- Voluntary renewable energy purchases

New York's 2020 *Order Adopting Modifications to the Clean Energy Standard* [99] notes that biomass and biogas were included as renewable energy sources under the Renewable Energy Standard but not under the CLCPA definition of renewable energy systems. After considering comments on the *White Paper on Clean Energy Standard Procurements to Implement New York's Climate Leadership and Community Protection Act*, New York State's Public Service Commission adopted the proposal to allow Renewable Energy Certificates for energy generated by biogas and biogas facilities to remain eligible through 2029. Additionally, the Order Adopting Modifications to the CES directed NYSERDA to honor obligations under existing contracts with biomass and biogas resources and make no changes to its existing contracts. Nearby states, such as Maryland, consider WTE a renewable energy source.[100, 101] Relevant New York State climate goals are summarized in **Table 4.**

Table 4. Relevant New York Climate Leadership and Community Protection Act Goals

New York State Climate and Energy Goals	Climate Goal Details
Clean Energy Standard	70% renewably sourced electricity by 2030 zero-emission electric grid by 2040
Greenhouse gas (GHG) Reduction	40% reduction of GHG emissions (from 1990 levels) by 2030 85% reduction in GHG emissions (from 1990 levels) by 2050
Source: Clean Energy Standard,[102] New York State Climate Act[4] **Note:** New York State also has building energy efficiency and decarbonization goals.	

Thermal Treatment and New York State Climate Goals

Thermal treatment technologies may be used to support New York State's climate goals. The use of alternative fuels in the transportation sector is of particular interest, as alternative fuels can support the transition of hard-to-electrify medium- and heavy-duty vehicles from fossil fuel use. Renewable diesel and renewable jet fuel are identified in integration analysis scenarios for meeting the GHG reduction requirements of the Climate Act. However, the Act prioritizes electrification and the use of hydrogen fuel cells due to air pollutants released by the combustion of alternative fuels and potential impacts to overburdened communities. The Climate Act Scoping Plan notes:

> One path to achieving 2030 emissions reduction requirements includes strategies to make limited use of renewable diesel and other lower-carbon fuels to replace diesel in existing internal combustion engine

vehicles until the transition to ZEVs is complete. Policies like clean transportation standards could be designed to support decarbonization by displacing fossil fuels with low-carbon electricity and other fuels with lower GHG emissions and co-pollutant emissions, including green hydrogen and alternative fuels. Development of these policies should be mindful of the Climate Justice Working Group's (CJWG) admonition to avoid fuel policies that extend reliance on fossil fuel infrastructure or allow emissions from fuel combustion to continue to disproportionately impact Disadvantaged Communities.[4]

The Scoping Plan also calls for research, development, and market assessments for emerging technologies, including research to identify appropriate uses and impacts of alternative fuels in building end-uses, district energy systems, industrial, agriculture, waste, and power sectors. The use of alternative fuels can sometimes result in equal or greater amounts of air pollution compared to fossil fuels, and the commercial-scale success of many technologies has been limited. The Scoping Plan notes that zero-emission resources should be prioritized, and alternative fuels should only be used strategically and when they are proven to be safe; do not burden disadvantaged communities; and demonstrate air quality, GHG, and health benefits.[4]

Regulations Affecting Thermal Treatment Technologies

United States

Historically, waste incineration has been a popular waste management method both in the United States and globally. New York City was home to the first waste incinerator in the United States, which opened in 1885 on Governors Island. But in 1999, the last incinerator in the city closed, and apartment-house incineration was banned within the five boroughs to protect public health.[103,104] Until the enactment of the Clean Air Act of 1963, waste incinerators in the United States were unregulated and generally uncontrolled.

The Clean Air Act of 1963 (42 U.S. Code § 7401) established air pollution control programming, authorizing research into techniques for monitoring and controlling air pollution. Seven years later, the United States enacted the Clean Air Act of 1970 (42 U.S. Code 7401 et seq. 1970), which began regulating emissions from both mobile and stationary sources, including the waste management sector, and banned uncontrolled burning of waste. As a result, waste incineration facilities, including those in New York City, were required to install emission control technologies and often shut down due to the cost of upgrades. By 1976, stricter regulations were also placed on landfills. Between 1960 and 1980, the incineration of MSW in the United States declined from 31% to 9%.[105,106,107]

In the 1990s, the United States enacted further regulations to mitigate mercury and dioxin emissions under Maximum Achievable Control Technology (MACT) regulations. In 1990, Section 129 was added to the Clean Air Act and focused entirely on emissions from solid waste combustion, requiring that such facilities implement restrictions set forth by MACT. Section 111 and Section 129 mandated that EPA create new source performance standards for new waste combustion facilities. Sections 111(d) and 129 also mandated the creation of emission guidelines for units that are already operational.[107,108,109]

Between 2000 and 2019, at least 31 incinerators nationwide were closed primarily due to economic factors, including the cost of required upgrades and loss of contracts. Safety hazards, recycling mandates, odor complaints, emissions violations, and federal fraud convictions were other factors contributing to these closures.[110]

Thermal treatment facility types that are regulated by Section 129 of the Clean Air Act include commercial and industrial solid waste incineration units, hospital/medical/infectious waste incinerators, large municipal waste combustors, small municipal waste combustors, sewage sludge incinerators, and other solid waste incinerators. Due

to the novelty of ATT technologies, it is not clear under current legislative guidelines whether or not solvolysis, hydrothermal liquefaction, and thermal hydrolysis fall within the same regulations. Stationary sources of hazardous air pollutants (HAPs), including thermal treatment facilities, are subject to the Clean Air Act National Emission Standards for Hazardous Air Pollutants (NESHAP). Examples of facilities subject to these regulations include hazardous waste combustors, off-site waste and recovery operations, and publicly owned treatment works. EPA defines hazardous air pollutants as those that are either known or potential carcinogens or are either known or suspected to cause reproductive issues, birth defects, or adverse environmental harms.[111,112]

Many U.S. states have defined WTE as a renewable source of energy in their Renewable Portfolio Standard, including several that do not currently have operational WTE plants. Others have included WTE as part of other renewable energy laws. This includes New York, whose only applicable feedstock is unadulterated biomass.[113]

The Inflation Reduction Act classified gasification, pyrolysis, and solvolysis as “chemical recycling” or “advanced recycling,” both of which were eligible for tax credits.[114,115] The Department of Energy also funds chemical recycling under its $25 million *Strategy for Plastics Innovation* plan.[116]

Pyrolysis facilities are regulated as small waste combustion units and institutional waste incinerators, following the reversal of a 2020 industry-supported proposal that would have removed their regulatory requirements under the Clean Air Act.[117,118] As of June 2025, EPA does not consider pyrolysis or other “chemical recycling” or “advanced recycling” techniques as applicable to the attainment of the circular economy, as per the *Draft National Strategy to Prevent Plastics Pollution*, promulgated in 2023. EPA also acknowledges the potential risks of pyrolysis oil impurities when plastics are used in feedstock.[119]

In 2023, EPA proposed a new ruling under the Toxic Substances Control Act for the regulation of 18 chemicals that are manufactured using PUP waste feedstocks. Feedstock containing chemical impurities, including cancer-causing per- and polyfluoroalkyl substances (PFAS), dioxins, phthalates, polybrominated diphenyl esters (PBDEs), alkylphenols, perchlorates, benzophenone, organochlorine pesticides (OCPs), ethyl glycol, methyl glycol, or n-methylpyrrolidone (NMP), bisphenol A (BPA), and heavy metals, would require a review by EPA prior to its transformation into fuels to ensure that the chemicals are not emitted into the environment.[120]

New York State

Combustion and thermal treatment facilities in New York State are regulated by 6 NYCRR 362-1: Combustion Facilities and Thermal Treatment Facilities. Certain facilities are exempt, including:

- some that combust site-generated medical waste (those that are operated by either staff of a hospital, a residential health care facility, a diagnostic treatment center, or a clinical laboratory as defined by 10 NYCRR Part 70)
- some animal crematories (that do not accept regulated medical waste)
- some that combust alternative fuel in accordance with 6 NYCRR Section 215.3: Exceptions and Restricted Burning to combust solid waste, as outlined in 6 NYCRR 362-1.2: Exempt Facilities
- facilities that combust traditional fuel not stored at the facility

Certain facilities must be registered in New York State, including waste tire thermal treatment facilities processing fewer than 10 tons daily, used cooking oil or yellow grease thermal treatment facilities with a process feed rate of less than 1,000 gallons daily, and certain facilities that store authorized alternative fuels prior to combustion. Nonexempt facilities that do not fit registration requirements must obtain New York State permits.[121, 122]

Other U.S. States

WTE practices and regulations differ between states, with some states classifying WTE incineration as clean or renewable energy in support of the respective state's climate goals. Plastics pyrolysis is likewise undergoing legislative deliberation surrounding its contributions to safe and sustainable waste management practices.

As of 2023, 19 states passed bills that regulated plastic pyrolysis. The legislation varies, with some states excluding plastic pyrolysis from the permitting required for solid waste management facilities, defining them instead as manufacturing facilities. In some states, manufacturing facilities are subject to more lenient regulations compared to solid waste management facilities. Other states maintain that plastics pyrolysis facilities should be regulated as solid waste management facilities. At least 15 states were considering new or additional legislation aimed at regulating plastic pyrolysis in 2024.[117]

Michigan has enacted a clean energy bill that allows the energy harnessed via incineration and landfilling to count towards the attainment of its state climate goals. As part of its goal of 100% clean energy by 2040, Michigan now includes WTE incineration as part of that vision. Michigan also considers landfill gas-to-energy and "methane digester" facilities clean energy, but it excludes fuels that are made from post-use polymers, tires, tire-derived fuel, and plastic, as well as other fossil fuels.[123]

In California, where the California Integrated Waste Management Act of 1989 mandates that jurisdictions divert a minimum of 50% of their generated waste annually, waste diversion credits were once granted to waste managed by WTE incinerators for up to 10% of waste. However, recent legislation AB 1857, signed by California Governor Gavin Newsom in 2022, removed such credits.[124,125,126]

Commercial Scale Operations

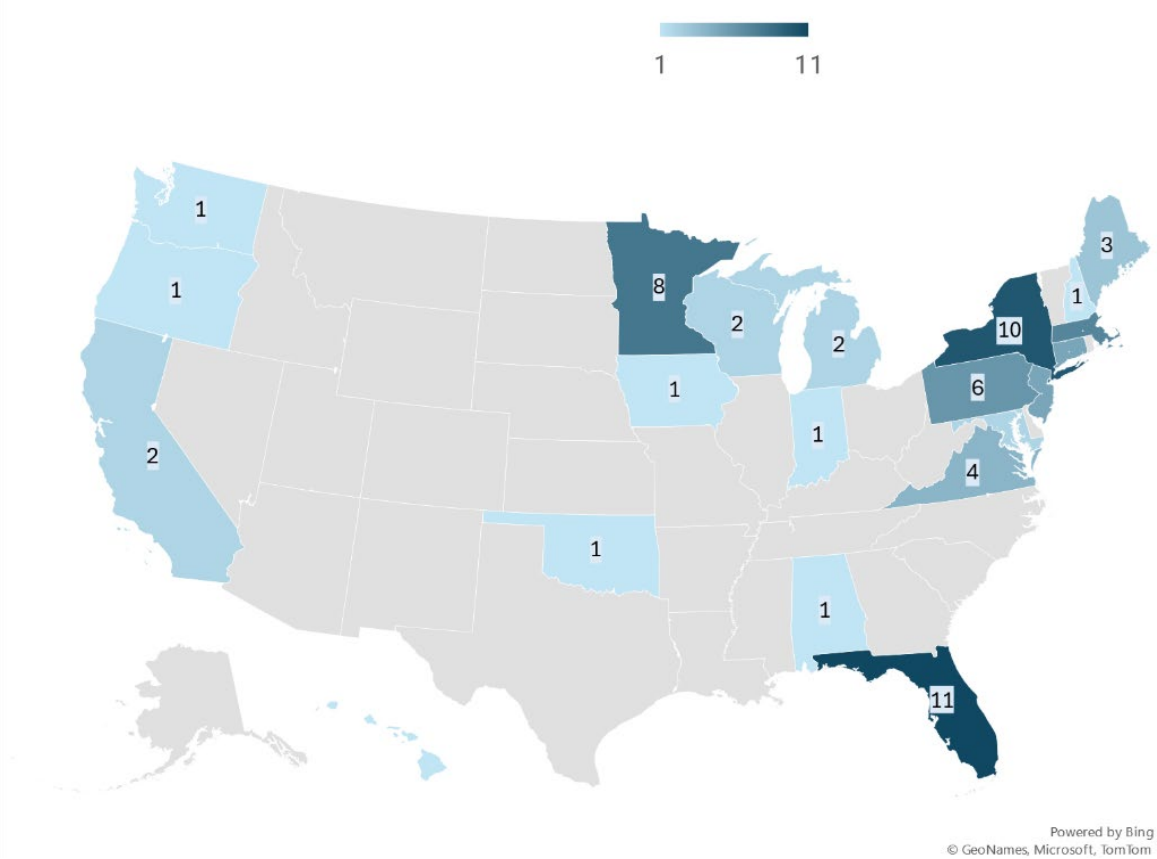
The U.S. DOE defines the highest level of technology development, or Technology Readiness Level 9, as "system operations" demonstrating the "actual system operated over the full range of expected mission conditions."[127] Commercial-scale thermal treatment facilities should theoretically reach this metric. However, some facilities have experienced major operational and technical issues, leading to facility closure. Additionally, commercial scale operations are not necessarily economically feasible, and some facilities have closed due to financial constraints.

Incineration

United States

In 2018, more than 34 million tons of MSW were combusted in the United States.[15] In 2018, United States had 75 MSW WTE facilities in 21 states. Florida contained the greatest number of WTE facilities (11), followed by New York State (10). The number of WTE facilities in each state in 2018 is shown in **Figure 2**. Since 2018 some of the facilities outside New York state have closed.[113]

Figure 2. Number of WTE Facilities by State in 2018



Source: *Energy Recovery Council*[128]

Of these 75 WTE facilities, 41 were privately owned, and 65 were privately operated. As of 2018, 58 of these facilities generated energy via mass burning, 13 via refuse derived fuels (RDF), and four via modular systems. Fifty-eight of the 75 facilities generate electricity, while three generate steam, and 14 generate a combination of both heat and power.[113]

As of 2024, there were 126 commercial waste combustors in the United States. EPA defines commercial waste combustors as "those that are allowed to accept waste from offsite" and identifies four types of waste combustors: hazardous waste combustors; municipal solid waste combustors; hospital, medical, and infectious waste incinerators; and commercial and industrial solid waste incinerators. Of the 126 U.S. commercial waste combustors, 27 are hazardous waste combustors; 72 are MSW combustors (following the closure of three WTE plants); 9 are hospital, medical, and infectious waste incinerators; and 18 are commercial and industrial solid waste incinerators.[129] Reworld and Wheelabrator are key industry players in this sector, owning many of the privately owned incineration facilities. Local governments and municipalities also own incineration facilities. **Table 5** lists the WTE facilities in New York State.

Table 5. New York State MSW WTE Facilities*

Facility	Location	Owned by	Operated by	Opened	Description
Babylon Resource Recovery Center	West Babylon, NY	Reworld (formerly Covanta); private	Reworld; private	1989	Mass burn technology; can process up to 750 tons of MSW per day and has an electrical capacity of 16.8 MW.
Reworld Hempstead	Hempstead, NY	Reworld; private)	Reworld; private	1989	Mass burn technology; can process 2,505 tons of MSW per day and has an electrical capacity of 72 MW.
Dutchess County RRF	Poughkeepsie, NY	Dutchess County Resource Recovery Agency; public	Wheelabrator Dutchess County Inc.; private	1987	Mass burn technology; can process up to 450 tons of MSW per day and has an electrical capacity of 9.8 MW.
Huntington RRF	East Northport, NY	Reworld; private	Reworld; private	1991	Mass burn technology; can process up to 750 tons of MSW per day and has an electrical capacity of 24.3 MW.
MacArthur WTE	Ronkonkoma, NY	Islip Resource Recovery Agency; public	Reworld; private	1990	Mass burn technology; can process up to 486 tons of MSW per day and has an electrical capacity of 12 MW.
Niagara Falls RRF	Niagara Falls, NY	Reworld; private	Reworld; private	1980	Mass burn technology; can process up to 2,250 tons of MSW per day and has a steam capacity of 470,000 pounds per hour and an electrical capacity of 32 MW.
Onondaga RRF	Jamesville, NY	Reworld; private	Reworld; private	1995	Mass burn technology; can process up to 990 tons of MSW per day and has an electrical capacity of 39.2 MW.
Oswego County Energy Recovery Facility	Fulton, NY	Oswego County; public	Oswego County; public	1986	Modular; can process up to 200 tons of MSW per day and has a steam capacity of 60,000 lbs/hr and an electrical capacity of 4 MW.
Wheelabrator Hudson Falls	Hudson Falls, NY	Wheelabrator Hudson Falls, LLC; private	Wheelabrator Hudson Falls, LLC; private	1991	Mass burn technology; can process up to 500 tons of MSW per day and has an electrical capacity of 15 MW.
Wheelabrator Westchester	Peekskill, NY	Wheelabrator Westchester, L.P.; private	Wheelabrator Westchester, L.P.; private	1995	Mass burn technology; can process up to 2,250 tons of MSW per day and has a steam capacity of 18,000 lbs/hr and an electrical capacity of 60 MW.

Source: 2018 Directory of Waste-to-Energy Facilities[113]
Note: *Facility data is from 2018; all facilities were still listed as active in New York State's Active Solid Waste Management Facilities dataset as of January 2025.[130]
MSW – Municipal Solid Waste; MW – megawatts; RRF – Resource Recovery Facility; WTE – waste-to-energy; lbs/hr - pounds per hour

Global Operations

Incineration is much more common in other countries where space for landfilling is limited. Below are some unique examples of incinerators.

- **Amager Bakke:** Located 10 minutes from the city center of Copenhagen, Denmark, this incineration plant's uniquely sophisticated pollution control systems allow it to exist in such close proximity to residential and commercial areas. It treats 10% of all of Denmark's waste, and its emissions are significantly lower than EU regulation requirements. This plant generates both heat and electricity. Much of this facility is open to the public as a park.[94]
- **Horgen Waste to Energy Plant:** Located in Switzerland, this facility was among the first to use dry bottom ash discharge. Traditionally, slag is fed into a wet extractor for cooling, which makes it very challenging for incinerators to extract non-ferrous metals (aluminum, zinc, copper, and even gold) from the ash.[131] Not feeding slag into a wet extractor for cooling makes it possible to extract nonferrous metals from the bottom ash, allowing the facility to reclaim valuable metals, mitigating the need for mining, and reducing the volume of waste sent to landfills.

Gasification

As of 2020, there were 686 gasifiers operating in 272 large-capacity facilities processing non-fossil and biomass/waste feedstocks in about 30 countries. Total syngas production from these facilities was about 200 gigawatts of thermal energy (GWth) in 2020. Only about 100 of these use waste as feedstock.[132] In recent years, a number of gasification plants have shut down. Independent Commodity Intelligence Services (ICIS), which launched a global database of plastic pyrolysis projects in 2021, reported in November 2024 that over 90% of the 2024 operating capacity for gasification in North America had ceased operations.[133]

As another example, the Fulcrum Sierra BioFuels Plant and Feedstock Processing Facility in Nevada was the first commercial scale landfill waste-to-fuels plant to produce transportation fuels. The facility was projected to produce 10 million gallons of waste-derived aviation fuel or diesel annually. However, a variety of major mechanical and operational issues halted operations and permitting, and the facility was shuttered in 2024 with Fulcrum Bioenergy filing for bankruptcy. The plant and processing facility were sold to other companies in late 2024.[134]

United States

The following gasification plants are operational in the United States:

- **Aries Clean Energy:** In Lebanon, Tennessee, a plant was developed in 2016, which used fluidized bed and downdraft gasification technology to divert 8,000 tons annually of green wood, pallet wood, municipal sludge, and tires from landfills, at a maximum throughput of 64 daily tons. The plant also had the capacity to generate 300 kW of electricity for use at the Lebanon Wastewater Resource Recovery Facility (WRRF).[135] As of August 2025, it is unclear if this plant is still operating. However, Aries Clean Energy opened a biosolids gasification plant in Linden, New Jersey (Aries Linden) in 2024 that is designed to process around 400 tons of biosolids daily.[136]
- **Ecoremedy Morrisville Municipal Authority:** Located in the greater Philadelphia region, this plant gasifies biosolids cake from the Morrisville Municipal Authority WRRF. The plant processed 25,000 wet tons of biosolids in 2019. The process involves gasification of biosolids into thermal energy, dry biosolids, activated biochar, and concentrated minerals. The plant uses syngas to produce the thermal energy used for the thermal drying

process of biosolids, avoiding the use of 52,630 MCF of natural gas annually. Of the original biosolids volume, the remaining 2% is concentrated to residual carbon and landfilled.[137]

- **Eastman Chemical Company:** Located in Kingsport, Tennessee, this facility is part of a larger refinery complex and uses gasification and methanolysis (a type of solvolysis or chemical recycling). The facility was in high-priority violation of the Clean Air Act from 2022-2024 and has had violations of the Clean Water Act and non-compliance with RCRA in recent years.[138] In 2024, Eastman was selected to receive federal funding to open a second facility in Longview, Texas.[139]
- **Taylor Biomass Energy:** Located in Montgomery, New York, this plant can use biomass, including MSW, C&D waste, wood waste, sludge, and other industrial biomass waste streams as feedstock. The site's current capacity stands at 307 daily tons of C&D waste and 100 daily tons of wood waste.[140]

Global

Two other gasification plants operate globally:

- **JFE Steel Group Chiba Recycling Center:** Located in Chiba, Japan, this plant uses gasification technology to process industrial waste and MSW. Syngas generated by this technology is used to power steel factories. This facility processes waste in several stages, including waste compaction, degassing pyrolysis, gasification and melting, homogenization of slag, gas reforming, gas cooling, gas purification, and water treatment.[141]
- **Surrey Municipality/Surrey Biofuel Facility:** Located in Surrey, British Columbia, Canada, this plant processes organic residue and waste streams. It is the first closed-loop organic waste facility in North America and produces high quality compost and renewable natural gas. The fuel generated is used to power organic waste trucks.[142]

Pyrolysis

Pyrolysis facilities are not as common in the United States as incineration or gasification facilities. Limited information on pyrolysis facilities is publicly available; however, a list of identified facilities is compiled below.

United States

- **Alterra Energy:** Located in Akron, Ohio, this facility uses a continuous feed pyrolysis reactor to treat 60 tons of plastic waste per day. This facility considers itself to be the only full-scale, continuous facility to perform such processing.[143] Other pyrolysis plants use batch processing pyrolysis.
- **Braven Environmental:** Located in Zebulon, North Carolina, this pyrolysis facility processes 12,000 tons of plastic waste per year. The facility produces a proprietary blend of pyrolysis oil called Braven PyChem, marketed for use as fuel or to produce plastic. However, a Compliance Evaluation Inspection by the North Carolina Department of Environmental Quality (DEQ) found that when the company could not find a buyer for oil produced at the facility, it was disposed of as hazardous waste.[144] The facility was issued an Initial Imminent and Substantial Endangerment Order in 2023 and has been listed as a Significant Noncomplier under RCRA since 2022.[145] In 2023, a detailed investigation into the facility was published, exploring the discrepancies between health and safety claims made by the company and its history of hazardous waste production and permit violations.[146] The facility is still in operation as of 2025, and Braven is set to construct a new facility in Texarkana, Texas, announced on February 14th, 2025.[147]

- **Brightmark Plastic Pyrolysis:** Located in Ashley, Indiana, this facility uses pyrolysis to convert mixed plastic waste into pyrolysis oil. This facility was designed to process 100,000 tons per year of plastic waste. However, as of 2023, it had only processed 2,000 tons while dealing with fires, oil spills, and worker health and safety violations. From 2023-2025, it had an unresolved high-priority violation of the Clean Air Act.[141] Brightmark received $4.55 million in tax credits and grants, as well as $185 million in tax-free bonds. Brightmark itself provided $75 million in private equity.[116]
- **ExxonMobil's Petrochemical Refinery Complex:** Located in Baytown, Texas, the pyrolysis facility (opened in 2022) is within a larger refinery complex and uses a proprietary pyrolysis technology known as "Exxtend" to convert mixed plastic waste into pyrolysis oil.[148] The main complex in which the pyrolysis facility is located has been the subject of various air quality lawsuits and was previously ordered to pay a $19.95 million penalty for pollution violations.[73] ExxonMobil has expressed intent to further expand its proprietary plastic pyrolysis technologies throughout North America as well as globally.[149]
- **New Hope Energy:** Located in Tyler, Texas, this facility boasts a 95% plastic conversion rate into pyrolysis oil product. This facility also works with brands including Nalgene, Rubbermaid, Coach, Nespresso, and more to optimize plastic packaging for disposal using pyrolysis while also partnering with mechanical recycling facilities and municipal operations to minimize the incineration and landfilling rates of plastics. The facility was intended to process hundreds of thousands of tons of plastic annually. Company data regarding this facility is limited; however, company officials noted that this facility only processed one-third of the 50,000 tons per year of waste for which they had originally aimed (around 18,000 tons per year).[73,150]
- **Nexus Circular:** Located in Atlanta, Georgia, this facility uses pyrolysis to process difficult-to-recycle plastic waste. This facility is capable of processing four out of seven plastic types: HDPE (type 2), LDPE (type 4), PP (type 5), and PS (type 6). The facility intended to process 26,000 metric tons of plastic annually, but press releases indicated that it had processed only 1,400 tons between April 2021 and July 2022.[73,151]
- **Prima America:** Located in Northumberland, New Hampshire, this facility uses pyrolysis to produce synthetic diesel fuel from plastic waste feedstock. This facility was not operational for approximately one year (2019-2020) because it was noncompliant with environmental rules in New Hampshire. In 2023, a company manager at Prima America noted that the facility was in a "test phase," primarily due to economic factors.[152] Limited data is currently available regarding this facility's capacity.

Other Thermal Treatment Types

Hydrothermal Liquefaction

The Arbios Biotech Chuntoh Ghuna facility in Prince George, British Columbia, opened in 2025 and was the world's first commercial-scale hydrothermal liquefaction facility.[153] Additional facilities are in pilot and development stages in Turkey, Canada, Australia, and the United States.[154,155]

Solvolysis

Solvolysis is an emerging technology, with few commercial-scale solvolysis facilities in the United States. The previously mentioned Eastman Chemical Company facility in Tennessee uses both solvolysis and gasification, with design capacity to process over 100,000 metric tons per year of polyester (PET) waste.[156] The facility uses methanol and/or glycol to break down polyester into its monomers (like dimethyl terephthalate, and monoethylene glycol). The

facility's process produces a copolyester known as "Tritan Renew," a proprietary polymer, which is marketed as "as much as 50% recycled content."[157]

Additionally, PureCycle Technologies, which opened a plant in Ohio in 2023, achieved commercial-scale production with their solvolysis process in 2025. The company announced plans to build additional plants in Thailand, Belgium, as well as in the United States, in Augusta, Georgia.[158]

Thermal Hydrolysis

Thermal hydrolysis facilities are located in Asia, Europe, Oceania, North America, and South America. The majority of facilities are located in urban centers. In 2015, DC Water's Blue Plains facility in Washington, DC, began utilizing thermal hydrolysis, making Blue Plains the largest advanced wastewater treatment plant in the world.[159]

Assessment of Thermal Treatment Technologies

The efficiency and alignment of thermal treatment technologies with climate goals also depends on the available feedstock and alternate waste management practices. Thermal treatment may be optimized by combining treatment and processing technologies. One study evaluated the impacts of co-composting with biomass pyrolysis in Bangladesh. The combination of organic management techniques has the potential to improve nutrient recovery and reduce emissions at scale more efficiently than the current landfilling practices.[160]

Comparing Waste Streams, Emissions, Technology, and Operating Conditions

EPA has identified several life cycle analysis models that may be used to illustrate the comparative environmental, social, and economic impacts of different types of thermal treatments. A lower impact has been estimated for WTE processes relative to landfilling. These models do not, however, account for landfill gas collection, which may not accurately reflect modern advancements in landfilling technology, potentially estimating significantly higher methane emissions from landfills. One model was able to predict a significant reduction in emissions through the implementation of WTE.[161] Researchers at the University of Florida came to similar conclusions in their review of various life cycle analysis studies. They found that incineration tended to reduce GHG emissions compared to landfills, except for cases where landfills achieved more than 81% landfill gas collection efficiency with recovery of methane for energy. Landfill gas efficiency is also contingent on waste composition and may therefore be difficult to control sufficiently to reduce GHG emissions to a level at parity or below that of WTE incineration. High energy recovery of waste incinerators was found to be a key factor in the reduction of GHG emissions for WTE incineration as a waste management method.[162]

The efficiency of gasification is superior to incineration in terms of energy conversion. While the pyrolysis of organic material also generates syngas, studies suggest that pyrolysis is less efficient than gasification in syngas generation. Biomass pyrolysis does, however, also generate bio-oil, which can be further refined and used as an alternative to conventional fossil fuels.[41,54]

Human Health and Environmental Impacts

Pollutants from incinerators can adversely affect the environment and human health, through particulate matter (PM), lead, mercury, dioxins, and furans that are typically regulated by permit. The operating specifics, such as temperature and feedstock characteristics, also affect emissions.

The human health impacts of gasification, pyrolysis, and solvolysis are not well studied due to their recent emergence in the WTE field. However, similar risks have been identified. Stockpiling and processing plastic waste releases microplastics, poses the risk of long-term soil contamination, and risks fires with hazardous emissions. Nearly all plastics contain additives, many of which have been linked with ecotoxicity, reproductive toxicity, carcinogenicity, and endocrine disruption. Further, advanced thermal treatment facilities in the U.S. have in some cases failed to comply with environmental regulations and maintain safe work conditions with fires, oil spills, and worker health and safety violations.[73]

Knowledge Gaps and Biases

Emerging thermal treatment technologies, including gasification, pyrolysis, and solvolysis, are rapidly changing. Up to date information on facility operations, emissions, and effects on the local environment and health is therefore limited. Comparisons between emerging technology facilities are also limited due to the limited number of facilities and the incomplete capacity use of existing facilities. The comparative average energy return on energy input is also not reported for advanced thermal technologies.

Furthermore, biases within the literature on these topics can be found in publications sponsored by funders of ATT technologies, which are often connected to the petrochemical production and distribution industry, as well as in literature from environmental advocates concerned about the effectiveness of these technologies and their environmental effects. Reports developed by unaffiliated academics could present a more balanced perspective on plastics pyrolysis.

Key Points

- While incineration has been used for over 100 years, newer thermal treatment technologies are emerging. ATT technologies use heat to convert waste into fuel.
- The most common types of ATT technologies include gasification and pyrolysis, but other technologies such as hydrothermal liquefaction and solvolysis are in development.
- ATT technologies can produce syngas and/or pyrolysis oil, which can be combusted to generate energy. Pyrolysis oil has also been demonstrated as a building block for plastic production.
- New York State is considering applications for fuel produced by advanced thermal treatment to support sustainability goals.
- Despite having shown promise during their planning stages, in practice, many advanced thermal treatment facilities are struggling financially, have demonstrated difficulties meeting expected capacity, and have struggled to comply with environmental regulations.
- As New York City could benefit from new solutions to its waste challenges, it is important to continue to evaluate new technologies as they are developed and implemented globally and to consider adoption of new technologies that prove successful and sustainable as part of the next SWMP (beyond the 2036 planning horizon).

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NYC Solid Waste Management Plan 2026

Attachment I: New York State Executive Order 22 (EO22) Affected Entities

New York State Executive Order 22 (EO22), Leading By Example: Directing State Agencies to Adopt a Sustainability and Decarbonization Program applies to "Affected Entities", defined in EO22 as follows:

> "Affected Entities" shall mean any agency or department over which the Governor has executive authority, including all offices and divisions thereof, as well as all public authorities for which the Governor appoints the Chair, the Chief Executive, or the majority of board members, including all offices and divisions thereof, except for the Port Authority of New York and New Jersey. This shall include the State University of New York and the City University of New York."

Affected Entities are listed below.

1) AGING- Office for the Aging
2) AGM- Department of Agriculture and Markets
3) APA- Adirondack Park Agency
4) ARTS- Council on the Arts
5) BFSA- Buffalo Fiscal Stability Authority
6) BOE- Board of Elections
7) BPCA- Battery Park City Authority/Parks Conservancy
8) CDTA- Capital District Transportation Authority
9) CELG- Commission on Ethics and Lobbying in Government
10) CENTRO- Central New York Regional Transportation Authority
11) CIVIL- Department of Civil Service
12) CPB- Central Pines Barrens Joint Planning & Policy Commission
13) CUNY- City University of New York
14) DASNY- Dormitory Authority of New York
15) DCJS- Division of Criminal Justice Services
16) DEC- Department of Environmental Conservation
17) DED- Department of Economic Development
18) DFS- Department of Financial Services

19) DHCR- Division of Housing and Community Renewal
20) DHR- Division of Human Rights
21) DHSES- Division of Homeland Security and Emergency Services
22) DMV- Department of Motor Vehicles
23) DOB- Division of Budget
24) DOCCS- Department of Corrections and Community Supervision
25) DOH- Department of Health
26) DOS- Department of State
27) DOT- Department of Transportation
28) DPS- Department of Public Service
29) DVS- Division of Veterans Services
30) ECFSA- Erie County Fiscal Stability Authority
31) ECMC- Erie County Medical Center Corporation
32) EFC- Environmental Facilities Corporation
33) FCB- Financial Control Board
34) GAMING- Gaming Commission
35) GOER- Governor's Office of Employee Relations
36) HESC- Higher Education Services Corporation
37) HRBRRD- Hudson River- Black River Regulating District
38) HRVG- Hudson River Valley Greenway
39) IG- Office of Inspector General
40) ITS- Information Technology Services
41) JAVITS- New York Convention Center Operating Corporation
42) JC- Justice Center
43) LABOR- Department of Labor
44) LIPA- Long Island Power Authority
45) MNA- Division of Military and Naval Affairs
46) MTA- Metropolitan Transportation Authority
47) NFTA- Niagara Frontier Transportation Authority
48) NIFA- Nassau County Interim Finance Authority
49) NYPA- New York Power Authority
50) NYSBA- New York State Bridge Authority

51) NYSERDA- NYS Energy Research and Development Authority
52) NYSIF- Insurance Fund
53) OASAS - Office of Addiction Services and Supports
54) OCFS- Office of Children and Family Services
55) Office of Victim Services
56) OGDENSBURG- Ogdensburg Bridge and Port Authority
57) OGS- Office of General Services
58) OMH- Office of Mental Health
59) OPRHP- Office of Parks, Recreation, and Historic Preservation
60) OPWDD- Office of People with Developmental Disabilities
61) ORDA- Olympic Regional Development Authority
62) OTDA- Office of Temporary and Disability Assistance
63) PERB- Public Employment Relations Board
64) PORTOSWEGO- Port of Oswego Authority
65) RIOC- Roosevelt Island Operating Corporation of the State of New York
66) RTS – Rochester Genesee Regional Transportation Authority
67) SLA - Alcohol Beverage Control (State Liquor Authority)
68) SUNY- State University of New York
69) TAX- Department of Taxation & Finance
70) THRUWAY- Thruway Authority
71) TROOPERS- State Police
72) UDC- Urban Development Corporation
73) UNDC- United Nations Development Corporation
74) WCB- Workers' Compensation Board
75) WCMC- Westchester County Health Corporation