Current Recycling Systems in New York State

Data Collection, Gap Analysis, and Validation

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EXECUTIVE SUMMARY

Executing a recycling needs assessment for packaging and paper products in a state the size of New York is a substantial undertaking. As a first step toward such an assessment, the New York State Center for Sustainable Materials Management contracted with RRS to develop a detailed scope of work for the needs assessment, and determine what data is currently available, and what would need to be gathered by the team executing the needs assessment. This report offers a comprehensive inventory of the data available for the existing recycling systems in New York State as well as an analysis of gaps between current available data and data needed to execute the assessment. RRS's recommendations for closing those gaps are intended to inform the complete needs assessment which will define specific actions needed to ensure the recycling systems in New York State are maximizing the capture of recyclable materials to advance the circular economy.

As part of the initial phase of the Recycling Services and Infrastructure Needs Assessment and Gap Analysis in New York State, RRS examined available information for recycling program, facility, and processing data for towns, villages, hamlets, counties authorities, Recyclables Handling and Recovery Facilities (RHRFs), and waste collectors throughout New York State. Data sources included the 2023 New York State Solid Waste Management Plan, preliminary waste and recycling characterization data from the State University of New York at Stony Brook, preliminary recyclables composition data from the Center for Sustainable Community Solutions at Syracuse University, and a variety of other data sets related to the State's solid waste system obtained by the Center for Sustainable Materials Management (CSMM) at the State University of New York College of Environmental Science and Forestry.

Key research findings include:

- The majority of municipal solid waste (MSW) materials going to landfills and municipal waste combustors in New York State are recoverable. That is, 85 percent of the waste disposal stream is made up of recyclables that can be sorted and marketed by recyclables handling and recovery facilities (RHRFs), including unredeemed deposit containers, or organics that can be composted or anaerobically digested. Only 15 percent of the current MSW disposal stream is represented by materials that cannot be readily recovered in today's economy.
- Nearly 40 percent of the material currently disposed of in landfills and municipal waste combustors is recoverable through RHRFs (also commonly known as municipal recycling facilities or MRFs) and could be included in an extended producer responsibility program for packaging and paper products.
- Paper makes up an average of 65 percent of the materials handled in municipal recycling programs, followed by plastic at 15 percent, glass at nine percent, and metals at seven percent of the non-organic fraction of the MSW stream. Any state programs or policies seeking to provide sustainable financing for recycling must include packaging and paper products.
- There are significant gaps in data routinely gathered or reported, particularly related to recycling program performance and the recycling service provided, to multi-family residences, commercial generators, and institutional generators.

TERMINOLOGY

Bin – Commonly used open top, containers for recycling collection that typically have an 18-gallon capacity.

Commercial Waste – Commercial waste refers to Municipal Solid Waste (MSW), including recyclables, generated, and collected from commercial businesses of any size including, but not limited to, wholesale trade, retail, accommodation and food services, professional services, etc.

Carts – Commonly used containers for waste, recycling, and organics collection that have wheels on one side and a lid. Carts typically are sold in sizes of 35, 65, and 95 gallons.

Extended Producer Responsibility (EPR) – A policy approach that requires producers to take financial and/or physical responsibility for management of the products and/or packaging they produce at the end of their useful life.

Institutional Waste – Institutional waste refers to MSW, including recyclables, generated, and collected from institutions such as, but not limited to, educational institutions, hospital and health care institutions, and public administration locations. Waste and recyclables from the institutional sector are most often collected within programs serving the commercial sector but can also be part of residential collection programs.

Municipally Contracted – Municipally contracted refers to when a municipal government has a contract with a waste collector on behalf of their residents for waste and recyclables. All residents/property owners in the community have waste collection service provided by a waste collector selected and contracted by the municipal government on behalf of their residents/property owners.

Multi-family Residential – In this report, the multi-family residential sector refers to households within dwellings of five units or more, which includes apartment buildings as well as other residential facilities such as transitional housing units.

Municipal Collection – In this report, municipal collection refers to when a municipal government self-funds and directly provides its own waste and recyclables collection.

NYSDEC – New York Department of Environmental Conservation

Opt-in – A recycling or composting program that requires residents to take action to enroll or sign up to participate in the program. An opt-in program can be either fee-based or free of cost.

Opt-out – A recycling or composting program that automatically enrolls residents unless the resident takes action to decline the service.

Packaging and Paper Products (PPP) – Packaging and paper products refers to a group of materials including all packaging for the handling, delivery, transport, distribution, or presentation of another product and paper products, such as newspaper, cardboard, paperboard, magazines, catalogs, booklets, direct mail, flyers, and other paper fiber products. Often EPR programs are designed to cover packaging and paper products and are referred to as EPR for PPP.

Subscription service – The residents/property owners in the community must self-select and hire/contract with a waste and recyclables collector operating in the area.

RHRF – A Recyclables Handling and Recovery Facility, as defined in 6 NYCRR Part 361, handles source-separated recyclables (solid waste that exhibits the potential to be used repeatedly).

INTRODUCTION

The Center for Sustainable Materials Management (CSMM) contracted with RRS to develop a detailed scope of work for a Recycling Services and Infrastructure Needs Assessment in New York State, assess the currently available data, and identify information gaps that the full needs assessment will need to fill in order to determine the path toward a modern, effective recycling system in the state. This project was undertaken in anticipation of potential enactment of an extended producer responsibility program for packaging and paper products (EPR for PPP). EPR for PPP is intended to shift the costs of recyclables collection and processing from municipalities, residents and private waste collection and processing companies and require the brands that design and use packaging and products to fund the recycling collection and processing of those materials. A data gap analysis and a comprehensive statewide needs assessment are critical first steps needed to define the necessary actions to be taken under a new EPR for PPP program. This report is the first step for CSMM in the process of conducting a gap analysis and statewide needs assessment of the recycling systems in New York State. The scope of work for the full needs assessment is provided in Appendix A.

The municipal recycling system in New York State grew out of the enactment of the Solid Waste Management Act (Act) of 1988. Among the provisions of the Act is a requirement that municipalities adopt and implement source separation laws or ordinances requiring the separate collection of recyclables from all generating sectors – single family, multifamily and other residential generators, as well as commercial and institutional entities – by 1992. Importantly, nearly half of the MSW in New York State is generated by the commercial/institutional sector. While, for the most part, municipalities have met this obligation, local laws or ordinances vary substantially in their requirements, and it is unclear the level at which they are being implemented and enforced. This report identifies what is known, based on current reports and data sets. The full needs assessment will fill the gaps to provide a clearer picture of the level of recycling services to all residential, commercial, and institutional generators statewide.

In addition to requiring local laws or ordinances, the 1988 Act also created a local solid waste management planning framework through planning units that typically include multiple municipalities and/or counties (New York State Department of Environmental Conservation 2023). Like local ordinances, the plans developed by the current 69 planning units in the state vary substantially, as do the programs they encompass. A lot has changed since 1988, especially in terms of how waste and recycling services are provided. The recently released 2023 New York State Solid Waste Management Plan reports that if New York City's municipal system is excluded, most of the municipal solid waste (MSW) in New York State is managed by the private sector -- either through contracts with municipalities (26%) or contracts directly with their customers (45%).[1] Where municipal collection is provided, it typically serves single-family through four-unit homes.

Private collectors are not required to report to the state on the services provided or materials recycled. While some municipalities require such reporting, it is inconsistent and not regularly compiled. As the recycling system evolved and increasingly privatized, the policy framework remained largely the same. The avenues for gathering data envisioned in 1988 – largely municipal reports and planning unit plans and updates – are not sufficient to capture the range of activities in the current marketplace.

The full statewide needs assessment will compile data on how the recycling systems in the State operate, including the amount and types of material collected, the existing collection, sorting, refill, reuse, and organics infrastructure and operations. It will define the operational and capital investments needed to ensure an efficient system capable of meeting the State's goals of maximizing waste reduction and recycling and minimizing disposal. In the initial phase detailed in this report, RRS worked with CSMM and others, to analyze and validate currently available data on the recycling operations in the State, capacity, and infrastructure, and conducted a gap analysis to determine what other data is needed to obtain the breadth of understanding needed to execute the full statewide needs assessment.

[1] New York City offers municipal collection for all residences (single and multi-family) and institutional generators, with 60% of the state's MSW is handled through municipal collection, with 15% municipally contracted and 25% privately contracted.

DATA AVAILABILITY AND TRACKING

SECTION SUMMARY

Recycling is a system that requires the collection, processing, and manufacturing of new products from previously manufactured materials to reduce waste disposal and processing, preserve landfill space, reduce greenhouse gas emissions, minimize dependence on virgin materials, create local jobs, and stimulate economic activity. For this system to fully function, residents, businesses, and institutions must be well informed about what to put in and keep out of their recycling containers; RHRFs must have the sorting capacity and storage space to efficiently separate valuable commodities; and end markets must purchase materials for their manufacturing process to turn items back into usable products. Data and information reported by various stakeholders in the recycling supply chain can help to identify where the system is working well and where it needs improvement.

- *Regular data collection for single-family through four units residential, multi-family residential, and commercial and institutional recycling programs* – The combined residential sectors generate roughly half of all MSW in New York State, with the remaining generation coming from the commercial and institutional sectors (although some residential programs include some institutional recycling in their residential recycling data. Additionally, it should be noted that most municipalities, with the exception of NYC, do not include multi-family residential data in their residential recycling data.). Ensuring the success of diversion programs requires regular data tracking of available programs across the State, including residential (single-family through four units and multi-family), commercial, and institutional programs that often operate independently. There is much more information available about residential single-family through four-unit recycling programs than multi-family residential, commercial, and institutional programs in New York State. Relevant data includes numbers of households or businesses served, what materials are accepted or denied, how collection service is provided and by what entities – either opt-in or opt-out based programs, types and volume of containers, and recycling performance data such as participation rates, contamination rates, and program costs.
- *Community outreach and education efforts to help residents, businesses and institutions easily identify material descriptions of acceptable and unacceptable materials as aligned with local recycling laws or ordinances and RHRF guidelines* – Online recycling information is considered a critical point of communication to residents, businesses, and institutions on what is and is not recyclable. The level of information provided and the ease of finding that information varies widely across programs in the State. Information ranges from programs where online guidelines are non-existent to programs that offer easy-to-find, detailed information with pictures of items accepted and not accepted in the program. It is common for there to be a disconnect between what a municipal recycling coordinator, waste collector, local recycling law or ordinance, or RHRF says is accepted in the program and what is presented in online communications to residents, businesses, and institutions. For example, an RHRF may say they can accept aerosol cans and tin baking dishes, but those items are not listed as accepted in the online communications to residents, businesses, or institutions. Increasingly, residents are indicating that the first place they look for recycling program information is online, so online communication to residents is critical in ensuring the right materials end up in the recyclables collection container.

Recycling Programs

Effective tracking and evaluation of recycling programs requires regular qualitative and quantitative data collection. This section details the needed data to fully understand recycling programs for the single-family through four-unit residential, multi-family residential, commercial, and institutional sectors. It also defines what data is currently available and makes recommendations for additional data collection. The information provided here is based on the information provided in the 2023 New York State Solid Waste Management Plan, a review of available data provided by CSMM, as well as web-based and stakeholder input data validation on a subset of communities.

SINGLE-FAMILY THROUGH FOUR-UNIT RECYCLING PROGRAM DATA COLLECTED CURBSIDE

A detailed list of all data pieces that form a comprehensive view of the single-family through four-unit residential recycling system that is collected curbside is presented in Table 1, as well as the ideal unit of measurement and current data availability. The data that are partially available in New York State include the type of service provided, materials accepted in programs, and the collection type. The remaining data are not regularly collected across New York State, although some of the data may be available from individual municipalities or programs as provided in the 2023 New York State Solid Waste Management Plan Appendices.

Table 1: Complete List of Single-Family through Four Unit Residential Recycling Program Information & Data Collected Curbside

Data Item Description	Ideal Unit of Measurement	Current Data Availability
Type of service (Municipal collection, Municipal contract, Subscription)	Number and type of households	Partially available
Materials accepted in program	Itemized List: e.g., cardboard, plastic bottles and jugs, aluminum cans, etc.	Partially available
Container type & size	Bin, 32-gal cart, 64-gal cart, or 96-gal cart	Currently not reported
Collection type	Single-stream, dual-stream with fiber separated from containers, dual-stream with just glass separated	Partially available
Establishing service	Opt-in fee based, opt-in non-fee based, opt-out	Currently not reported
Frequency of collection	Weekly/bi-weekly / semi-weekly	Currently not reported
Recycling performance by material type	Lbs./household/yr.	Currently not reported
Recycling participation rates	Percent of households participating	Currently not reported
Recycling contamination rates	Percent of total material recovered	Currently not reported
Cost of recycling per household	$/household/yr.; $/ton/yr.	Currently not reported

Much of the data can be collected via municipal websites (e.g., type of service, materials accepted, container size and type, collection type, how to establish service, and frequency of collection), however, they are not routinely reported across the State. A number of these variables impact recycling program performance, such as:

- Average annual pounds per household collected is greater in communities with opt-out or automatic programs than programs that require residents to opt-in or sign up – 449 pounds per household annually compared to 331 pounds per household annually respectively (The Recycling Partnership (TRP) 2020).
- Average annual pounds per household collected is greater for programs that provide residents with carts than bins – 458 pounds per household annually compared to 360 pounds per household annually respectively (The Recycling Partnership (TRP) 2020).

Data such as recycling participation rates, contamination rates, and cost of recycling per household are often more challenging to collect statewide. These data are not consistently tracked across the State. Nonetheless, they are instrumental in the future needs assessment analysis.

MULTI-FAMILY RESIDENTIAL RECYCLING PROGRAM DATA

Table 2 details the scope of data needed to fully understand the availability and performance of multi-family residential recycling services. With rare exception, multi-family residential recycling collection is not provided curbside but instead through varying forms of containerized systems. At present, comprehensive data on multi-family residential recycling services is not available with the exception of NYC, where multi-family collection is provided by the City's Department of Sanitation. Most municipalities and counties do not track the details of multi-family residential recycling, as those services are provided by the private sector through contracts with the property owners. Gathering the data shown in Table 2 will require an extensive data collection process across the State.

Unlike single-family through four-unit residential recycling programs, much less information is available online regarding multi-family residential recycling programs outside of NYC. Information regarding the items accepted in the program, size of containers, collection type, collection frequency, and cost would likely need to be verified with the property owner who is contracting for the service. With rare exception, the list of accepted recyclables for all multi-family residential generators is the same as that collected through local curbside single-family through four-unit recycling program. Data such as recycling participation rates are likely unknown and would require a direct survey of multi-family residents. Finally, data on contamination and pounds per unit are rarely, if ever tracked. Most multi-family recycling programs outside of NYC are most often collected on route with commercial businesses and institutions by private waste collection companies such that a processor is unlikely to know the proportion of recyclables directly coming from multi-family residential collection.

*Table 2: Complete List of Multi-Family Recycling Program Information & Data**

Data Item Description	Ideal Unit of Measurement	Current Data Availability
Type of service (Municipal collection, Municipal contract, Subscription)	Number and type of units	Partially available
Materials accepted in program	Itemized List: e.g., cardboard, plastic bottles and jugs, aluminum cans, etc.	Currently not reported
Container type & size	Carts or dumpster size and number of containers	Currently not reported
Collection type	Single-stream, dual-stream with fiber separated from containers, dual-stream with just glass separated	Currently not reported
Establishing service	Ordinances requiring multi-family recycling alongside trash or establishing service is at the property owner's discretion	Currently not reported
Frequency of collection	Weekly, semi-weekly, bi-weekly, etc.	Currently not reported
Recycling performance by material type	Lbs./unit/yr.	Currently not reported
Recycling participation rates	Percent of units participating	Currently not reported
Recycling contamination rates	Percent of total material recovered	Currently not reported
Cost of recycling per unit	$/unit/yr.; $/ton/yr.	Currently not reported

**Note: Much of this information is available for New York City, where multifamily recycling is provided by the Department of Sanitation.*

COMMERCIAL AND INSTITUTIONAL RECYCLING PROGRAM DATA

The data needed to fully understand commercial and institutional recycling programs as laid out in Table 3 are mostly unknown. Some municipalities and counties such as Onondaga County conduct annual voluntary surveys of the commercial sector, but the annual survey response rates are often low. Most municipalities and counties do not track commercial and institutional recycling data in their recycling programs. Further complicating data tracking, institutional sector waste in most municipalities and counties recycling programs is collected on-route with or within the same program operations as commercial waste, so that institutional data would most often be mixed in with commercial data.

Table 3: Complete List of Commercial & Institutional Recycling Program Information & Data

Data Item Description	Ideal Unit of Measurement	Current Data Availability
Type of service (Municipal collection, Municipal contract, Subscription)	Number, size, and type of businesses or institutions	Currently not reported
Materials accepted in program	Itemized List: e.g., cardboard, plastic bottles and jugs, aluminum cans, etc.	Currently not reported
Container type & size	Cart or dumpster size	Currently not reported
Collection type	Single-stream, dual-stream with fiber separated from containers, dual-stream with just glass separated	Currently not reported
Establishing service	Voluntary sign up at businesses discretion, mandated by ordinance	Currently not reported
Frequency of collection	Collection frequency per week	Currently not reported
Recycling performance by material type	Lbs./establishment/yr.	Currently not reported
Recycling participation rates	Percent of businesses	Currently not reported
Recycling contamination rates	Percent of total material recovered	Currently not reported
Cost of recycling per establishment	$/business/yr.; $/ton/yr.	Currently not reported

Information regarding commercial and institutional recycling is generally not detailed on community webpages. Gathering the data outlined in Table 3 will require a similar level of effort as gathering the data for multi-family residential recycling collection. An important consideration with the commercial and institutional sector is that the waste types generated can vary significantly by type of business and institution. In 2015, CalRecycle published a waste characterization study of the commercial sector in which the State sampled the entire waste stream – trash, recycling, and compost – from different types of commercial businesses and institutions such as hotels and lodging, medical and health, restaurants, retail trade, services such as professional and repair services, and educational institutions. The report demonstrated significant differences in the amount and type of recyclables generated by varying commercial and institutional entities (CalRecycle 2015).

DROP-OFF RECYCLING

Drop-off recycling programs are vital avenues for recycling for many rural residents, residents who are subject to private subscription requirements in their municipality but who chose not to hire a collection contractor, multi-family residents who find their recycling services insufficient, and for recycling programs to capture unique hard to recycle material that are not subject to local source separation laws or ordinances. Table 4 presents the needed data to fully understand drop-off recycling programs. The remaining information listed in Table 4 is not currently reported; however, some recycling programs that operate drop-off programs may track some of the data listed below.

Table 4: Complete List of Drop-Off Recycling Program Information & Data

Data Item Description	Ideal Unit of Measurement	Current Data Availability
Type of service (permanent or temporary site)	Permanent or temporary site	Currently not reported
Hours of operation	Hours of operation	Currently not reported
Materials accepted in program	Itemized List: e.g., cardboard, plastic bottles and jugs, aluminum cans, etc.	Partially available
Collection type	Single-stream, dual-stream with fiber separated from containers, dual-stream with just glass separated	Partially available
Service availability	Anyone, residents of municipality, residents of county, commercial and institutional	Currently not reported
Recycling performance by material type	Lbs./visitor/yr.	Currently not reported
Recycling participation rates	Percent of households utilizing site out of total households available to use site	Currently not reported
Recycling contamination rates	Percent of total material recovered	Currently not reported
Cost of recycling per household	$/household/yr.; $/ton/yr.	Currently not reported

Information on drop-off programs is often detailed online such as location, hours of operation, what is accepted at the site, how residents should prepare their recyclables, and who can use the site. Other data such as pounds per visitor, the percentage of material from households, businesses, or institutions using the site, and operating costs, would need to be gathered by contacting the operator of the drop-off site directly. The drop-off site may have data on the level of contamination that could be collected.

RECYCLABLES HANDLING AND RECOVERY FACILITIES (RHRF)

Comprehensive Data for Processing Facilities

In New York State, RHRFs are any facilities that handle non-putrescible source-separated recyclables, including recycling drop-off sites, recycling transfer facilities, and recycling processing and aggregation operations. The State defines source-separated recyclables as recyclables that have been separated from the waste stream at the point of generation pursuant to State or local law or ordinance or a voluntary program where the transporter manages the materials in a source-separated manner. With that definition, there are several exceptions for facilities that are not considered RHRFs but are part of the larger waste diversion network such as compost facilities, construction and demolition recyclables handling and recovery facilities, scrap metal processors, vehicle dismantlers, waste tire recycling and handling facilities, and electronic waste recovery facilities. In 2022, there were approximately 358 RHRFs in New York State with 45 permitted facilities and 313 registered facilities.

Together, RHRFs and transfer facilities form the backbone of the recycling hub-and-spoke network that moves recyclables from collection points to end markets. Some of the data presented in and are included in the current RHRF reports such as the facility name, address, and owner and operator names and addresses. Some information is partially available through the RHRF reports such as the incoming stream type and the type of end markets where commodities are sent. Additionally, a number of items presented in these tables are currently unknown and will require working with processors across New York State to obtain. In this project, RRS interviewed several processors to understand the availability of some of the unknown data. The results of this effort are presented in the Stakeholder Engagement section of this report.

As a part of the research for this report, RRS interviewed several individuals at RHRFs and waste collectors to better understand their operations. A challenge identified through the interview process in differentiating recycling transfer operations, simple bale and sort operations, and recycling drop-offs.

Table 5: Complete List of Recyclable Handling and Recovery Facility Information & Data

Data Item Description	Ideal Unit of Measure	Availability
Facility name	Text description	Data available
Facility address	Address, city, county, state, zip	Data available
Owner name & address	Text description, address, city, county, state, zip	Data available
Operator name & address	Text description, address, city, county, state, zip	Data available
Ownership type	Private or public	Data available
Operator type	Private or public	Partially available
Facility incoming stream type	Single-stream, dual-stream, fiber	Partially available
Facility incoming stream source	Residential, commercial, institutional	Partially available
Materials accepted	Itemized List: e.g., cardboard, plastic bottles, and jugs, aluminum cans, etc.	Partially available
Contamination rate	Percent of incoming stream	Data available
Commodities produced	Itemized list: e.g., mixed paper grade #54, glass 3 mix, natural HDPE, colored HDPE, etc.	Partially available
End markets used	Type of end market, address, commodities sent, quantity sent	Partially available
Facility mechanization level	Mechanized sorting, sort by hand, combination	Currently unknown
Facility technology	Trommel, screens, ballistic separators, optical sorters, AI Equipment	Currently unknown
Design capacity	Tons per day, month, or year	Data available
Average throughput	Tons per day, month, or year	Partially available
Space utilized	Square feet	Currently unknown
Space available for expansion	Square feet	Currently unknown
Service areas	Municipalities, planning units, or counties	Data available

Table 6: Complete List of Transfer Facility Information & Data

Data Item Description	Ideal Unit of Measure	Availability
Facility name	Text description	Data available
Facility address	Address, city, county, state, zip	Data available
Owner name & address	Reported by facility or website	Data available
Operator name & address	Reported by facility or website	Data available
Ownership type	Private or public	Data available
Operator type	Private or public	Partially available
Facility incoming stream type	Single-stream, dual-stream, fiber	Partially available
Facility incoming stream source	Residential, commercial, institutional	Currently unknown
Design capacity	Tons per day, month, or year	Data available
Average throughput	Tons per day, month, or year	Partially available
Space utilized	Square feet	Currently unknown
Space available for expansion	Square feet	Currently unknown
Service areas	Municipalities, planning units, or counties	Partially available
Material types inbound	Itemized list: single-stream recyclables, commingled recyclables, organics, refuse	Partially available
Material types outbound	Itemized list: cardboard, single-stream recyclables, commingled recyclables, organics, refuse	Partially available
Source-separated commodities accepted	Itemized list: electronics, appliances, scrap metal	Partially available
End markets used	Type of end market, address, commodities sent, quantity sent	Partially available

Organics facilities are regulated separately from RHRF facilities in New York State. As a key component of the diversion system in New York State, these facilities will be included in the larger statewide needs assessment to follow this work. While RRS did not review organics facility data for the work of this report, the team did review reporting forms and requirements. To facilitate the next stage of the needs assessment of recycling infrastructure in New York State, Table 7 and Table 8 present a complete list of information and data that will need to be compiled to support the statewide needs assessment.

Table 7: Complete List of Compost Facility Information & Data

Data Item Description	Ideal Unit of Measure	Availability
Facility name	Text description	Data available
Facility address	Address, city, county, state, zip	Data available
Owner name & address	Text description, address, city, county, state, zip	Data available
Operator name & address	Text description, address, city, county, state, zip	Data available
Ownership type	Private or public	Partially available
Operator type	Private or public	Partially available
Facility incoming stream type	Yard trimmings, source separated organics, other (manure, sawdust/shavings, animal carcasses, etc.)	Data available
Facility incoming stream source	Residential, commercial, institutional	Currently unknown
Materials accepted	Itemized list: leaves, branches, wood, yard clippings, food scraps, compostable plastic, etc.	Data available
Contamination rate	Percent of incoming stream	Partially available
Finished compost product produced	Tons/cubic yards per day, month, or year	Data available
Commodities distributed	Itemized list: mulch, bagged compost, bulk compost	Data available
End markets used	Type of end market, address, commodities sent, quantity sent	Partially available
Facility processing technology	Windrow, aerated static pile, in-vessel	Data available
Facility sorting technology	Trommel, de-packager, magnet	Currently unknown
Design Capacity	Tons/cubic yards per day, month, or year	Data available
Compost left on site	Tons/cubic yards per day, month, or year	Data available
Age of oldest product on site	Months	Data available
Space utilized	Square feet	Currently unknown
Space available for expansion	Square feet	Currently unknown
Service areas	Municipalities, planning units, or counties	Currently unknown
Finished compost analysis	Lab report sampling analysis	Data available

Table 8: Complete List of Anaerobic Digestion Facility Information & Data

Data Item Description	Ideal Unit of Measure	Availability
Facility name	Text description	Data available
Facility address	Address, city, county, state, zip	Data available
Owner name & address	Text description, address, city, county, state, zip	Data available
Operator name & address	Text description, address, city, county, state, zip	Data available
Ownership type	Private or public	Partially available
Operator type	Private or public	Partially available
Facility incoming stream type	Food waste, yard trimmings, source separated organics, FOGs, manure	Data available
Facility incoming stream source	Residential, commercial, institutional	Currently unknown
Materials accepted	Itemized list	Data available
Facility processing Technology	Wet, high solids	Data available
Facility pre-processing Technology	Centrifugal separator with finer screening, graded and blended, shredded, and screened	Currently unknown
Average detention time in digester	Days	Data available
Average temperate in Digester	Degrees Fahrenheit	Data available
Age of oldest digestate on site	Months	Data available
Quantity of solids Produced	Wet tons	Data available
Solid Content	Percent total	Data available
Solid destination	Animal bedding, topsoil, composting, land application	Data available
Quantity of liquids Produced	Gallons	Data available
Destination of liquids	Wastewater treatment, land application	Data available
Design capacity	Tons/cubic yards per day, month, or year	Data available
Space utilized	Square feet	Currently unknown
Space available for Expansion	Square feet	Currently unknown
Service areas	Municipalities, planning units, or counties	Currently unknown
Service areas	Municipalities, planning units, or counties	Currently unknown

Waste Generation and Waste Composition Studies

The State University of New York at Stony Brook provided RRS with preliminary data obtained through conducted waste characterization studies across New York State beginning in 2019. The studies encompassed sampling portions of the MSW and portions of the recycling streams from landfills, transfer facilities, and RHRFs across much of the State. This data is only initial waste compositional work and does not address the complete MSW stream in most instances, but it is important data to use for initial analysis. RRS analyzed the 2022 data collected by the State University of New York at Stony Brook in conjunction with the extensive data reported in the 2023 New York State Solid Waste Management Plan to understand regional generation rates and differences and material composition. The data provides a robust base from which to form the understanding of disposal and recycling patterns needed to execute the full needs assessment.

WASTE GENERATION IN NEW YORK STATE

Figure 1 and Table 9 present the average disposal, recycling, and composting by NYSDEC region (Figure 8), presented in pounds per person per year (Left y-axis on Figure 1). Also displayed in Figure 1 and Table 9 is the estimated recovery rate using 2018 data from the 2023 New York State Solid Waste Management Plan. The recovery rate was calculated by dividing recycling and composting by total waste generation in each NYSDEC region. The average annual pounds of waste disposed or recovered per person for disposal and recovery in New York State was 1,391 and 357 respectively with an overall average recovery rate of 19 percent in 2018. In 2018, the U.S. MSW generation rate was 4.91 pounds per person per day. The average in New York State was slightly below the U.S. average at 4.79 pounds per person per day. The average recovery rate of 19 percent in New York State, which includes recycling and composting, lagged the reported 2018 national average of 32 percent (U.S. Environmental Protection Agency 2018). It is however important to recognize that the universe of materials included in the calculation or various recovery rates as well as the waste composition differences in the various areas of the country play a role in comparing any data.

Figure 1: Estimated Pounds Per Capita Disposal, Recycling, and Recycling Rates in NYSDEC Regions

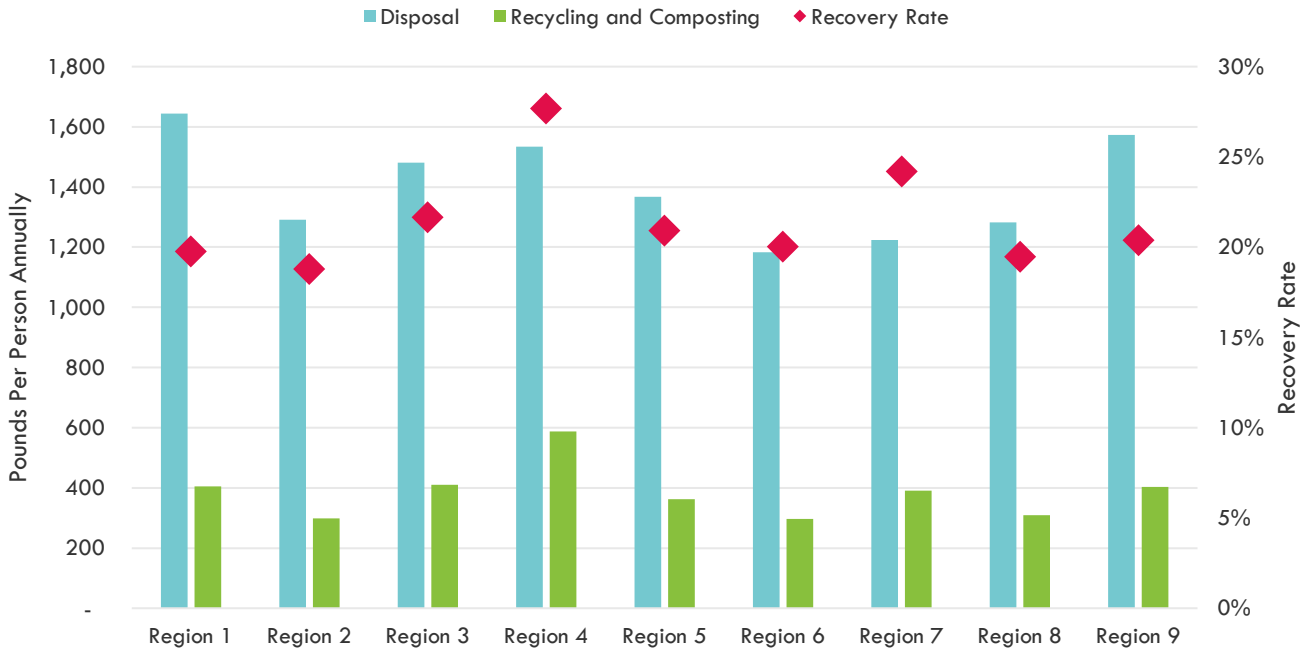


Table 9: Estimated Pounds Per Capita Disposal, Recycling, and Recycling Rates in New York State

Region	2018 Population	MSW Disposed (Tons)	Recycled & Composted (Tons)	Disposal (lbs./per yr.)	Recycling and Composting (lbs./per yr.)	Recovery Rate
Region 1	2,833,381	2,330,000	573,966	1,645	405	20%
Region 2	8,390,081	5,413,000	1,254,606	1,290	299	19%
Region 3	2,322,431	1,720,050	475,731	1,481	410	22%
Region 4	912,989	699,900	267,899	1,533	587	28%
Region 5	581,970	397,800	105,366	1,367	362	21%
Region 6	537,866	318,100	79,741	1,183	297	20%
Region 7	1,165,354	712,750	227,502	1,223	390	24%
Region 8	1,326,787	850,600	205,715	1,282	310	19%
Region 9	1,420,330	1,117,000	286,246	1,573	403	20%
Total/Average	**19,491,189**	**13,559,200**	**3,476,772**	**1,391**	**357**	**20%**

WASTE COMPOSITION IN NEW YORK STATE

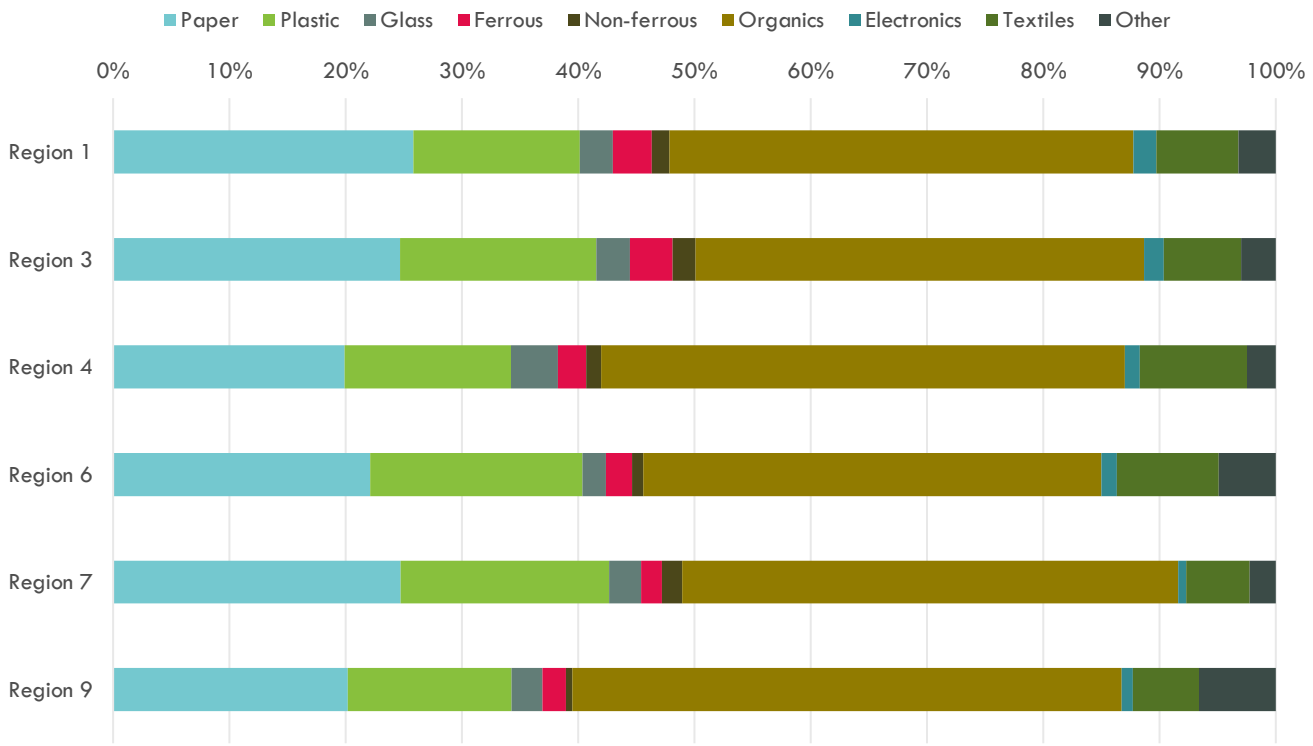
The State University of New York at Stony Brook's preliminary waste characterization information provides partial MSW and recyclable composition data for NYSDEC Regions 1, 3, 4, 6, 7, and 9. The data provided a preliminary assessment of material composition for both disposal and recycling for portions of the MSW stream.

DISPOSAL

The three largest components of the disposal stream for each NYSDEC region were organics (including food waste, yard trimmings, and wood waste), paper (including corrugated cardboard, newsprint, boxboard, magazines, and cartons), and plastic (including plastic resins #1 through #7) (Figure 2 and Note: "Other" includes batteries, hazardous household waste, and other inorganics.

Table 10). Together, these categories, which are largely recyclable or compostable, encompassed 79 percent to 85 percent of the disposed weight.

Figure 2: Disposal Waste Sort Composition Data 2022 for NYSDEC Regions



Note: "Other" includes batteries, hazardous household waste, and other inorganics.

Table 10: Disposal Waste Sort Composition Data 2022 for NYSDEC Regions

Region	Paper	Plastic	Glass	Ferrous	Non-ferrous	Organics	Electronics	Textiles	Other[2]
1	26%	14%	3%	3%	1%	40%	2%	7%	3%
3	25%	17%	3%	4%	2%	39%	2%	7%	3%
4	20%	14%	4%	2%	1%	45%	1%	9%	2%
6	22%	18%	2%	2%	1%	39%	1%	9%	5%
7	25%	18%	3%	2%	2%	43%	1%	5%	2%
9	20%	14%	3%	2%	1%	47%	1%	6%	7%

[2] The category "other" includes batteries, hazardous household waste, and other inorganics. For the New York City data only (Region 2) the category other includes non-compostable wood, other inorganic, construction, and demolition in the MSW stream, household hazardous waste, and batteries.

On average, for the data presented, in the sampled NYSDEC regions, organics make up 40.6 percent of the disposal stream and consists of 23 percent food waste, 4.3 percent yard trimmings, 1.8 percent wood waste, and 11.2 percent other organics (e.g., soiled diapers, human and animal hair, kitty litter, dog feces, and feminine products). The amount of food waste in the disposal stream in New York State is comparable to the 2018 U.S. average of 21.6 percent. The level of both yard trimmings and wood waste in the disposal stream in New York State are significantly lower than the 2018 U.S. average of 12.1 percent yard trimmings and 6.2 percent wood waste, likely showing the impact of the efforts in New York State to divert yard trimmings and wood waste away from landfills and municipal waste combustors through municipal and county programs (U.S. Environmental Protection Agency 2018).

While understanding that the data is incomplete, RRS used the State University of New York at Stony Brook preliminary sort data collected in 2022 along with the total estimated MSW generated by NYSDEC Region to estimate the overall composition of the disposal stream by tons for each NYSDEC Region (

Table 11). Region 2, which represents New York City, was not part of the State University of New York at Stony Brook sort data. Instead, New York City's waste composition estimate is based on the 2017 composition analysis of New York City's waste stream. Regions 5 and 8 also were not sampled in the preliminary State University of New York at Stony Brook evaluations so the average compositions for all NYSDEC regions were used.

Table 11 presents the total estimated tons disposed in New York State by category type and NYSDEC region using this data.

Table 11: Estimated Total Tons Disposed in New York State

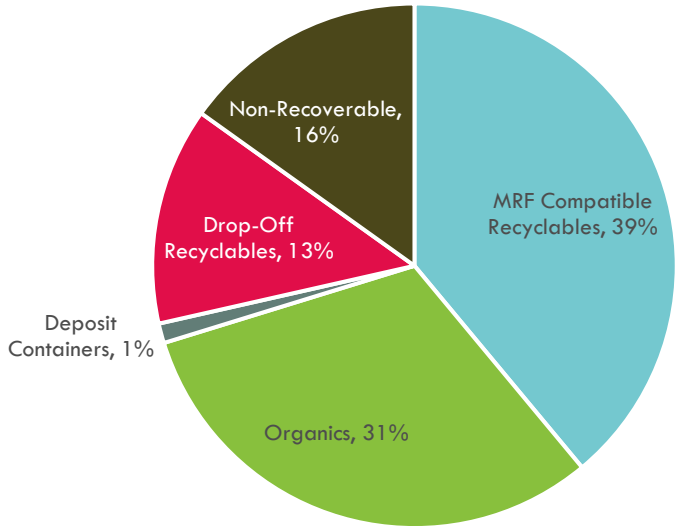
Region	Paper	Plastic	Glass	Ferrous	Non-ferrous	Organics	Electronics	Textiles	Other[2]	Total
1	602,262	333,230	65,912	78,034	34,897	930,191	45,858	164,396	75,220	**2,330,000**
2[3]	1,137,896	775,891	114,672	103,680	71,202	1,841,086	11,492	504,075	853,006	**5,413,000**
3	424,190	290,858	49,762	62,933	33,465	663,556	29,888	114,112	51,286	**1,720,050**
4	139,398	100,199	28,247	17,045	8,797	315,492	8,839	64,517	17,366	**699,900**
5[4]	91,140	63,505	11,379	10,311	5,289	167,601	5,306	28,389	14,879	**397,800**
6	70,341	58,100	6,435	7,172	3,040	125,222	4,310	27,844	15,636	**318,100**
7	176,356	127,787	19,421	12,782	12,632	303,945	4,813	39,149	15,866	**712,750**
8[4]	194,880	135,790	24,332	22,049	11,309	358,375	11,345	60,703	31,816	**850,600**
9	225,445	157,082	29,692	23,028	6,136	527,291	11,217	63,276	73,833	**1,117,000**
Total	**3,061,908**	**2,042,442**	**349,852**	**337,033**	**186,768**	**5,232,760**	**133,068**	**1,066,461**	**1,148,908**	**13,559,200**

In total, approximately 84 percent of the MSW disposal stream in New York State is reusable or recoverable material. Approximately 39 percent of the MSW disposal stream is material that is recoverable through RHRFs such as newspaper, cardboard, paperboard, mixed paper, plastic bottles and jugs, glass jars and containers, and aluminum and steel cans. Another 31 percent of the MSW disposal stream is organics, which is recoverable via

[3] Region 2 composition analysis is performed using New York City specific waste characterization data from 2017.
[4] Region 5 and 8 composition analysis is performed using a regional average from the State University of New York at Stony Brook sort data.

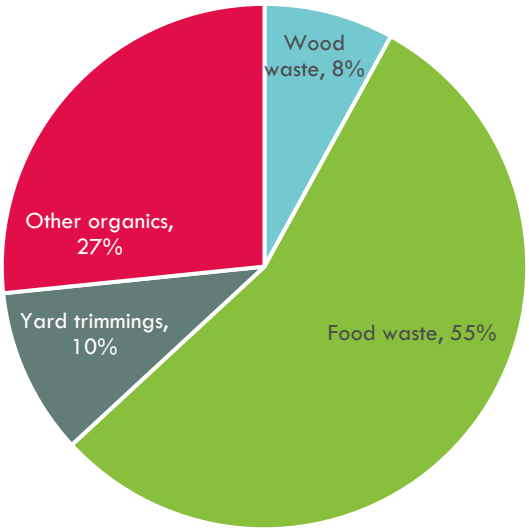
composting or anaerobic digestion such as food waste, yard trimmings, wood waste, and compostable paper. Approximately 13 percent of the MSW disposal stream includes items such as plastic film, bulky plastics, scrap metal, textiles, electronics, etc., which are readily recoverable through drop-off recycling programs. Finally, one percent of MSW being disposed of is estimated as deposit containers that could be captured through the returnable container redemption system in New York State. Only 15 percent of the MSW disposal stream are materials that cannot be readily recovered in today's economy (Figure 3). While it is not feasible to capture for diversion all materials currently going to disposal, there is significant opportunity to divert more materials from the MSW disposal stream for recycling, composting, and anaerobic digestion in today's current recovery economy.

Figure 3: Estimated Composition in New York State of MSW Disposal Stream Categorized by Recovery Potential



Isolating organics, food waste makes up 55 percent of total organic material and is estimated at 2.89 million tons of total disposal, representing a significant opportunity to reduce waste to landfill and municipal waste combustion and lower greenhouse gas emissions in New York State (Figure 4).

Figure 4: Breakdown of Composition in New York State of Organic Stream Only



RECYCLING

The State University of New York at Stony Brook sorted material from multiple RHRFs to estimate the composition of the MSW recycling stream processed at those RHRFs. While not complete information for all RHRFs, the data provides some preliminary information for analysis. The largest three components of the MSW recycling stream include paper, plastic, and glass materials, with paper making up more than half of the recycling composition for each NYSDEC region and encompassing 74 percent of the recycling composition for NYSDEC Region 3 (Figure 5 and Table 12).

Figure 5: Recycling Waste Sort Composition Data in NYSDEC Regions

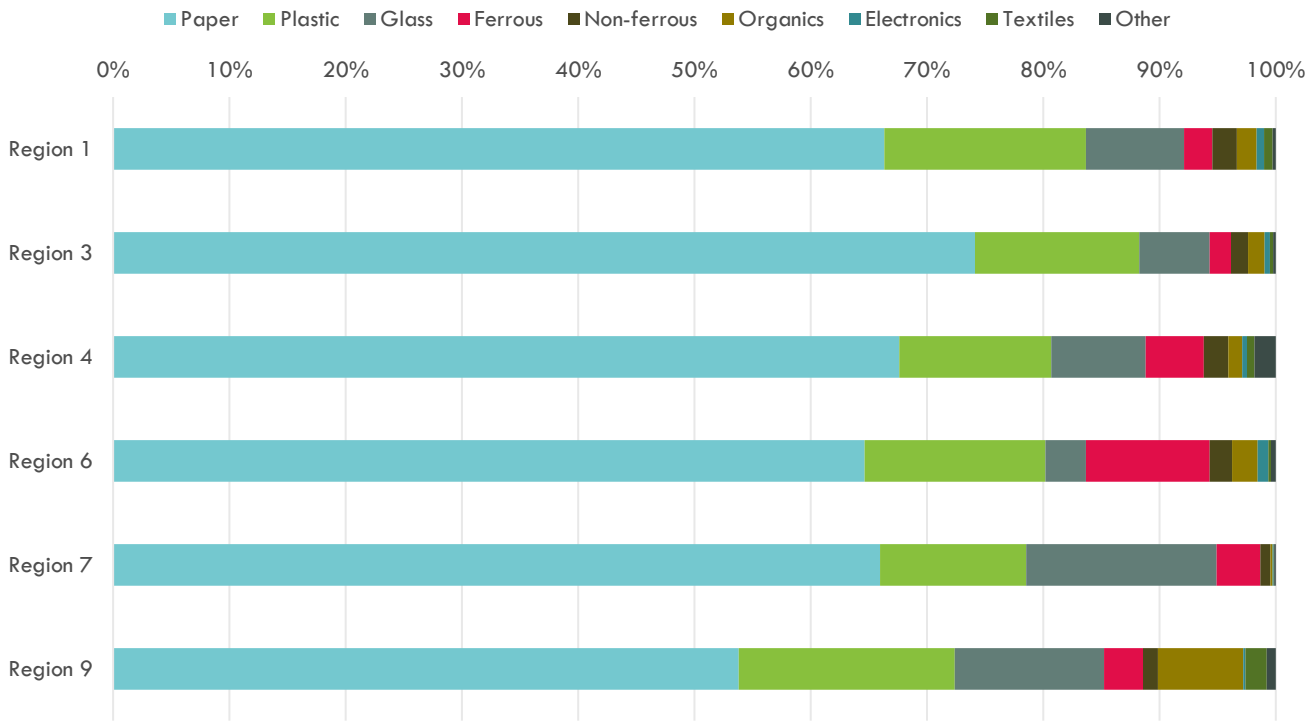


Table 12: Recycling Waste Sort Composition Data in NYSDEC Regions

Region	Paper	Plastic	Glass	Ferrous	Non-ferrous	Organics	Electronics	Textiles	Other[2]
1	66%	17%	8%	2%	2%	2%	1%	1%	0%
3	74%	14%	6%	2%	1%	1.5%	0.4%	0.3%	0.2%
4	68%	13%	8%	5%	2%	1.2%	0.4%	0.6%	1.8%
6	65%	16%	3%	11%	2%	2.2%	0.9%	0.2%	0.4%
7	66%	13%	16%	4%	1%	0.2%	0.1%	0.0%	0.1%
9	54%	19%	13%	3%	1%	7.3%	0.2%	1.8%	0.8%
Average	**65%**	**15%**	**9%**	**5%**	**2%**	**2%**	**0.5%**	**1%**	**1%**

Table 13 shows the estimated RHRF recycling rate by material type and NYSDEC region. The recycling rate is calculated by estimating the tons of material recycled based on the RHRF composition analysis and dividing that by the total estimated tons generated as reported in Table 9 (disposed and recycled). Glass and paper had the highest average recycling rates for the sampled NYSDEC regions at 35 percent and 34 percent, respectively. Average recycling rates for ferrous and non-ferrous metals were 24 percent and 20 percent respectively, though there was notable variation between the sampled NYSDEC regions, the cause of which is not currently known. Plastic had the lowest recycling rate at an average of 15 percent. Please note that the data in Table 13 represent a snapshot in time for a sample of the material in New York State and do not represent the total recycling rate for these materials in New York State as these data do not include recycling that bypasses RHRFs, such as commercial recycling that goes direct to end market. Instead, this table only represents the recycling rate through several RHRFs in New York State at the time the sampling event took place.

Table 13: Estimated RHRF Recycling Rate by Material Type and NYSDEC Region

Region	Paper	Plastic	Glass	Ferrous	Non-ferrous
1	28%	16%	32%	10%	18%
3	34%	13%	27%	8%	12%
4	45%	18%	33%	33%	29%
6	32%	12%	21%	43%	24%
7	35%	12%	55%	30%	9%
9	30%	18%	44%	21%	28%
Average	**34%**	**15%**	**35%**	**24%**	**20%**

Figure 6 provides only a snapshot in time of the volatility of recycling markets in New York State over the past five years and shows each commodity's contribution to the revenue generated by a typical ton of RHRF materials. While corrugated containers, mixed paper, and glass make up the majority of the weight in the MSW recycling stream (Table 14), these materials do not provide the majority of the average commodity revenue. In New York State specifically, the most valuable commodities include aluminum cans, natural HDPE, and colored HDPE (Figure 6).

Table 14 presents the five-year average commodity revenue in New York State, as well as the proportion of each RHRF ton and RHRF ton value represented by each commodity. It shows that aluminum cans earn an average of $1,315.14 per ton, natural HDPE earning $1,118.60 per ton, and colored HDPE earning $407.49 per ton.

Figure 6: Average Regional Commodity Revenue per Ton for Average New York State RHRF Composition, December 2018 – 2023 ($ per Ton)

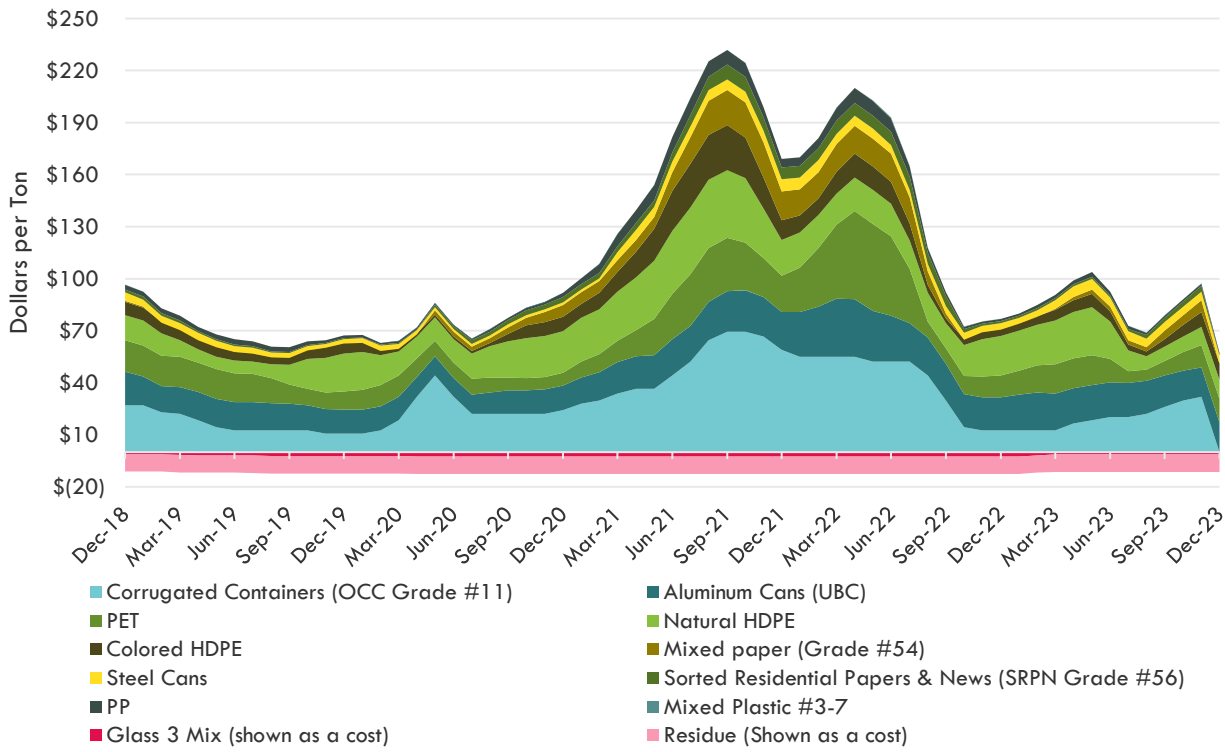
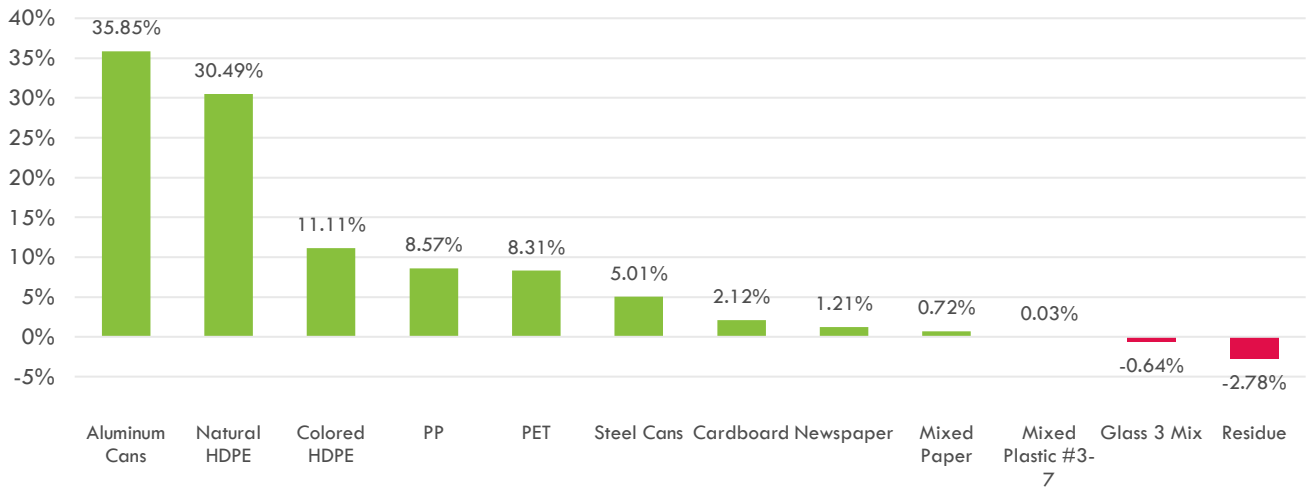


Table 14. Five-Year Average Commodity Revenue in New York State, December 2018 – 2023 ($ per Ton)

Commodity	Five-Year Average Commodity Value / Ton	Percentage of Total Value of MRF Ton	Average Percentage of Total MRF Volume
Mixed Paper (Grade #54)	$26.35	0.72%	20.82%
Sorted Residential Papers and News (SRPN Grade #56)	$44.54	1.21%	7.07%
Corrugated Containers (OCC Grade #11)	$77.92	2.12%	38.57%
Aluminum Cans (UBC)	$1,315.14	35.85%	1.41%
Steel Cans	$183.81	5.01%	2.24%
PET	$304.65	8.31%	5.62%
Natural HDPE	$1,118.60	30.49%	1.74%
Colored HDPE	$407.49	11.11%	2.06%
Mixed Plastic #3-7	$0.95	0.03%	0.30%
PP	$314.49	8.57%	1.11%
Glass 3 Mix (Shown as a cost)	$(23.65)	-0.64%	9.20%
Residue (Shown as a cost)	$(102.00)	-2.78%	9.85%
Total		**100%**	**100%**

Figure 7. Value Share of Five-year Average Commodity Revenue by Commodity in New York State



Glass typically has a negative value for RHRFs as most RHRFs routinely pay to transport and process glass from their facilities. As a result, glass is often cited by RHRFs as a problem material, particularly in single-stream systems.

Many operators told RRS they would like to see an expansion of the bottle bill to include more glass items on deposit. Statewide, there was significant variation in the amount of glass in the recycling stream by NYSDEC region with a low of three percent in NYSDEC Region 6 and a high of 16 percent in NYSDEC Region 7. The reason for this reported variation in the preliminary data is not currently known.

Table 15: Breakdown of Glass Composition in the Recycling Stream by NYSDEC Region.

Region	Deposit glass containers	Other glass containers	Glass fragments	Other glass
1	1.3%	5.0%	2.0%	0.2%
3	1.2%	3.0%	1.6%	0.3%
4	0.6%	6.1%	1.3%	0.2%
6	0.3%	2.1%	1.0%	0.0%
7	1.5%	12.5%	2.1%	0.2%
9	1.1%	8.7%	2.9%	0.1%

Table 16 shows the estimated total tons of materials passing through the RHRFs in New York State by NYSDEC region and commodity. Not all tonnages represented in these tables will ultimately be recycled. Some of these materials, particularly organics, electronics, textiles, and other materials are not items most RHRFs can typically process for end markets. Those materials would likely end up in the facility's residuals and disposed adding to the overall disposal rate.

Table 16: Total Estimated Tons Passing Through RHRFs in New York State by NYSDEC Region and Commodity[5].

Region	Paper	Plastic	Glass	Ferrous	Non-ferrous	Organics	Electronics	Textiles	Other[2]	Total
1	239,875	62,626	30,537	8,762	7,645	6,116	2,426	2,634	979	361,599
2[3]	396,786	146,664	120,503	70,161	15,459	14,666	3,568	4,757	17,838	790,402
3	222,153	42,332	18,196	5,450	4,399	4,354	1,270	881	677	299,711
4	114,141	22,032	13,683	8,472	3,526	2,031	686	1,087	3,118	168,776
5[4]	43,427	10,088	6,118	2,988	1,080	1,557	300	415	409	66,381
6	32,479	7,801	1,754	5,342	961	1,111	464	117	208	50,237
7	94,543	18,038	23,460	5,357	1,263	272	135	67	193	143,326
8[4]	84,786	19,695	11,944	5,833	2,109	3,040	585	811	798	129,600
9	97,065	33,484	23,111	6,079	2,338	13,210	340	3,263	1,445	180,335
Total	**1,325,255**	**362,759**	**249,305**	**118,443**	**38,780**	**46,357**	**9,772**	**14,032**	**25,664**	**2,190,366**

[5] Based on the data provided in the regional and planning unit waste summary tables, found in Appendix E of the Solid Waste Management Plan, RRS estimated that 63 percent of the total amount of MSW reported as recycled and composted is managed by RHRFs, with the remaining 37 percent reflecting organics diverted for composting. This table estimates the amount of each commodity recycled by applying the total recycled tonnages (63% of recycled & composted tonnages) to the recycling stream composition presented in Table 12.

STAKEHOLDER ENGAGEMENT & VALIDATION

RRS conducted targeted outreach to collect specific data points and fill certain data gaps related to the current recycling system's waste characterization and quantity, collection and transport networks, funding arrangements, and infrastructure and processing capacity. This stakeholder outreach and additional data validation and collection occurred simultaneously with the other data validation work described in Appendix B. Included in this outreach were interviews with seven local governments, and three waste collectors and processors (RHRFs). The interviews yielded additional data as well as recommendations for improved data collection, and challenges that will need to be addressed to execute the statewide needs assessment. The local governments and planning units interviewed are listed below. The three processors/waste collectors that were interviewed are not named to preserve anonymity.

Local Governments and Planning Units Interviewed

- New York City
- Niagara County
- Onondaga County Resource Recovery Agency (OCRRA)
- Oneida-Herkimer Solid Waste Authority (OHSWA)
- Town of Amherst
- Town of Brookhaven
- City of North Tonawanda

Recycling Program Stakeholders

STAKEHOLDER VALIDATION OF ACCESS INFORMATION

In each interview, RRS asked about accepted materials for recycling, collection method, and resident access to recycling, and compared that information to the recorded information provided by the NYSDEC and CSMM.

Table 17 summarizes the differences in information gathered through state-compiled, community-based data as compared to information provided during these stakeholder conversations. Common differences pertained to the acceptability of mixed paper (records did not capture that mixed paper is accepted) and the specific types of plastics accepted. Sometimes the resin codes accepted were significantly different than what was recorded in the existing data, and sometimes the recycling programs commented that resin codes were an inaccurate framework for recording acceptable materials, since acceptance of materials is also determined by format. Because data differences were identified through verification within a relatively small number of communities, it is likely that additional differences will exist across the statewide data on communities' material acceptance and service types/access. These differences may result from program changes being made in the time between the reporting and the interviews, or it may reflect inaccurate reporting.

Table 17: Differences between New York State data and recycling program verification on materials accepted for recycling and in collection service or access. The information received from interviewees was compared to what was recorded in New York State-provided spreadsheet datasets gathered from information either provided by the municipalities or from their websites.

Information provided	Fiber	Plastics	Glass	Metal	Collection Service / Access Information
Town A	Recorded as not collecting mixed paper, but do	Consistent	Consistent	Consistent	Population with access to residential drop-off recorded as 0%, but is somewhere closer to100%
Town B	Recorded as not collecting mixed paper, but do	Recorded as collecting #1, 2,3, 5, 6, 7. Collect #1, 2, 4, 5	Consistent	Consistent	Consistent
Town C	Recorded as not collecting mixed paper, but do	Recorded as collecting #1, 2. Collect #1, 2, 3,4, 5.	Recorded as collecting only clear glass, but also collect green & brown glass	Consistent	State is missing some data; All single-family homes (35,575) receive collection
County A	Recorded as not collecting mixed paper, but do	Consistent	Consistent	Consistent	Consistent
Waste Authority A	Consistent	Consistent; however, #1 and#5 categories are too broad; format matters	Consistent	Consistent; however, foil trays and wraps are also accepted	Recycling access by population recorded as: 43% municipal contract 25% municipal collection 32% private subscription - should be: 52% municipal contract 32% municipal collection 16% private subscription
Waste Authority B	Consistent	Recorded as collecting only #1, 2. Collect all cups and containers, regardless of resin	Consistent	Consistent	Consistent

STAKEHOLDER FEEDBACK ON DATA COLLECTION AND REPORTING

Reported Information: When asked about what information they report to the State, municipalities most often referenced monthly and annual tonnage reports of MSW and recycling. These reports contain totals, but not any information on composition within the streams. Other reports mentioned by recycling programs included an annual NYSDEC transfer facility report and an RHRF report on incoming tonnage and reject rate that is provided directly by the RHRF to the State. Waste Authorities also mentioned submitting reports quarterly in addition to annually, along with biennial Local Solid Waste Management Plan updates. The Authority's annual reports contain the total tonnage of recyclables and waste processed as well as the tonnage by the commodity of recyclable materials marketed.

One of the Authorities noted that as part of the Municipal Waste Combustor (MWC) permitting process, the annual recycling report is used to demonstrate at least a 40 percent recycling rate and that a market and technology report is used to determine if the program acceptance list could be expanded to divert more material from the MWC.

Method of Submission: Most recycling programs explained that they submit recycling data to the State in PDF form by email. One town explained that it provides its county with an Excel spreadsheet of the data, along with a PDF cover page. Another town said it uses Re-TRAC Connect to send e-waste data directly to the State through the State's website. Regardless of the format of the submitted data, each recycling program interviewed maintains underlying data in editable spreadsheets.

Desired Data at the Recycling Program Level: RRS asked recycling programs what additional data they would ideally have access to for better tracking their recycling programs. Multiple programs would like more granular information on waste composition. One recycling program said that it does not have a way to collect or estimate certain information – namely generation and destination of medical, construction and demolition (C&D) debris, and automotive waste – that should ideally be included in their report to the State. Another recycling program mentioned that even though it has sufficient data for reporting, it would like to know the breakdown of recycling generation by residential, commercial, and institutional sources. Other desired data points mentioned by recycling programs included: composition of recycling beyond the State University of New York at Stony Brook data, specific composition of C&D debris, and more complete commercial data. One Waste Authority requests recycling and disposal data from commercial and industrial entities in its jurisdiction, but those entities are not obligated to provide data. The Waste Authority recognized that the State does step in to help with data from entities that do not respond to the Authority, but it explained that this process of commercial data gathering should be streamlined. Multiple recycling programs also desired more information around participation rates – this includes single-family through four-units recycling participation rates, unit-level participation rates in multi-family buildings, and cart set-out rates. This can be helpful for benchmarking over time and with other recycling programs. Some programs also would like to know more about how much waste generated is going to landfills versus MWC.

Suggested Role of the State in Data Collection: Some recycling programs interviewed had given thought to how the State might support them in data collection beyond what is done currently. Of those that had, they were split between those that thought additional State support for data collection would be helpful, and those that did not. In addition to noting that the State could support local programs by streamlining data reporting and collection, some programs requested assistance with end-market development for commodities that are difficult to sell and suggested expanding the bottle bill to help with a cleaner recycling stream. One recycling program interviewed believes that the State would be valuable in helping programs obtain more complete commercial data, as the State is in a better position to do this than local government. Another recycling program suggested that the State could start requiring entities disposing above a certain quantity of waste to periodically conduct a waste characterization study; this could help with gathering data on commercial waste generation.

Collected Data Beyond State Requirements: Some recycling programs voluntarily collect certain information that is not required to be reported to the State. This includes participation rates, tonnage collected per route, units served per route, and composition of special waste streams. One program even records daily participation in terms of the number of totes set out per day. One Waste Authority maintains recycling access data by municipality, which includes access type (private subscription service, municipal collection, or municipally contracted), the contracted

waste collector, contract end date, and the bin type used for residents/customers. The other Authority collects similar information on which municipalities within the Authority collect which streams and through which waste collectors. Other recycling programs interviewed only collect the minimum required data because they do not have the personnel to track additional information.

Residential Data: When asked about what residential recycling data they have, most recycling programs said they do not conduct surveys, and only some data can be traced to residential generation. One recycling program experimented with conducting audits for certain neighborhoods, but it has since ceased that effort due to negative feedback from residents who were concerned about privacy. There is often more and/or higher resolution data on single-family through four-units recycling than there is for multi-family recycling. One Waste Authority said it can estimate the volume of single-family through four-unit residential materials arriving at the RHRF by summing tonnages from front-end loaders, which are only permitted to collect from single-family through four-unit houses. Another Authority tests the residue rate of one residential recycling truck in their service area twice a year to measure the contamination rate of residential waste. Lastly, different programs have different definitions for what constitutes multi-family housing – in some programs, residences with four or more units were designated as multi-family, and in others, it was residences with five or more units.

Commercial and Institutional Data: Throughout the interview process, recycling programs routinely communicated that they have no need or authority to request waste and recycling data from commercial generators in their jurisdictions – commercial generators are under no legal obligation to respond to such requests. While both Waste Authorities indicated that they do distribute surveys and attempt to fill data gaps with help from the NYSDEC, commercial data collection efforts are ultimately contingent upon voluntary participation and therefore incomplete. In one instance, a Waste Authority noted that they cannot even derive the breakdown of commercial and residential tonnages from the weight of compactors specifically permitted to transport commercial waste because those compactors may service apartment buildings and businesses on the same collection route.

Institutional data is also not typically collected by recycling programs. The two Authorities interviewed mentioned that institutions like colleges and universities make their own collection arrangements to send their comingled recyclables to the RHRF. One Waste Authority did mention that it will conduct free waste audits for campuses, but they did not explain how this kind of data is utilized.

Other Feedback: Some recycling programs communicated other feedback that they hope will be useful to the State. One program said that they would like to see consolidation of the types of plastic used by manufacturers so that recycling education is more straightforward for residents and recycling programs. Another issue mentioned by some stakeholders was the timeframe in which they receive feedback from the NYSDEC and its impact on the accuracy of the data held by the State. Some recycling programs stressed that they need the NYSDEC to review waste-related data submitted to the State more quickly as sometimes the data or programs change before they receive a response. A last call out from the stakeholder interviews was the challenge of identifying what facility was owned by or connected to what entity.

NEW YORK CITY

New York City is the State's most populous municipality and generates approximately 40 percent of the overall MSW in the State. As the City represents a major part of waste management in New York State, RRS has compiled some of the City's current efforts at data tracking and challenges.

Data Tracking: New York City is in the process of collecting and assessing all available recycling data. At the time this report was published, that data was not fully compiled and available. The New York City Department of Sanitation collects waste and recycling from the residential and institutional sectors in the City, while the commercial sector is served by private waste and recycling collection companies. Of the three generating sectors, the City has the least clarity on the commercial sector waste and is working to piece together the flow of commercial waste and recycling through voluntary data from transfer facilities and RHRFs operating in and serving the City. A major challenge to tracking the commercial data currently is a significant portion, estimated at 15 to 30 percent, is moving out of State and is not reported to the City.

Commercial Waste Zones: In 2019, New York City passed a law establishing commercial waste zones, dividing the City into 20 zones with each zone served by up to three waste collectors. The City plans to begin piloting the first waste zones starting in 2024. At present, the City is in the process of reviewing responses to their request for proposals from waste collectors that desired to be selected as one of the 65 commercial waste collection contracts operating within the zones (Rachal 2023). Additionally, five Citywide contracts will be awarded for the collection of containerized waste and compactors. Part of the goal of dividing the City into commercial waste zones and requiring waste collectors to bid for contracts to serve commercial customers was to improve the collection of commercial data.

RECOMMENDATION FOR RECYCLING PROGRAM DATA COLLECTION

Stakeholder interviews yielded a wide range of opinions on whether recycling data collection and management systems merit enhancement and change. Recycling program representatives acknowledged data gaps at the town, county, or waste authority level. They are seeking additional information on the composition of recycling and other waste streams, and more data on commercial, institutional, and C&D debris generation, participation rates, and destinations of streams. Stakeholders suggest that the data metrics for the needs assessment be streamlined and gathered through their input.

Processor and Waste Collector Stakeholders

GENERAL OPERATIONS, REPORTING, AND DATA COLLECTION FINDINGS

RRS interviewed several RHRF processors and waste collectors operating in New York State. Some key takeaways from the interviews were also included in earlier recommendations in this report and include data collection, education and outreach, domestic end markets, and the flow of recyclables in New York State.

Reporting Data to Local Governments: Processors and waste collectors report data to recycling programs when requested or specified by contracts. Many recycling programs do not require or request data from RHRFs or waste collectors. The use of best practices in contract reporting requirements could paint a more accurate picture of these data.

Reporting Data to Recycling Programs on Commodities and Contamination Rates: Some RHRF operators indicated they only knew their overall contamination rate and commodities sorted and baled and did not perform any municipal- or county-specific audits. Other processors indicated they do perform municipal- and county-specific audits in instances where data are required by contract with the municipality or county. Data on specific contamination rates from private subscription or commercial customers are not collected.

Commercial versus Residential Data: Some processors know the proportion of material incoming that is residentially sourced and commercially sourced. However, it is unknown how much material would be specifically from single-family through four-unit or multi-family residents. In addition, some processors cannot differentiate between residential and commercial loads when they are collected on one route.

Commercial Data: Processors generally will not know the number of commercial businesses serviced unless the processor is also the waste collector for those businesses. Processors are not performing audits on commercial-only material or reporting data back to businesses and will not know specific volumes or weights of material collected on the business level unless all collection vehicles are equipped with onboard scales.

Collection Operations: Most waste collectors will have a combination of municipal contracts for recycling collection and commercial and residential subscription customers.

Education and Outreach: Processors indicated that they are performing regular education and outreach efforts to customers such as newsletters, social media, website information, bill inserts, and in some instances, direct interaction with the municipality or recycling program.

Hub-and-Spoke-Network: Processors in New York State are utilizing a hub-and-spoke network in which material is consolidated at transfer facilities and then moved to RHRFs. In some instances, the processor may be transporting their own material, consolidating it at their transfer facility, and then transporting it to their RHRF. In some cases, material will flow between competing companies. For example, one company may deliver recyclables to their competitor's transfer facility or RHRF in instances where that makes economic sense.

Tracking of Material Destination: RHRFs do not always know the end markets for their materials, especially in cases where commodities are sold to brokers that then sell the material to end markets. In some instances, processors are also in the brokerage business and may broker material from competing RHRFs to end markets. In general, RHRFs seem to be able to point out what commodities are sold domestically or exported.

Costs: Processors indicate a general price per ton for processing, and some processors adjust the price based on contamination rate audits performed. For recycling programs with higher contamination rates, the RHRF may charge extra for waste residue disposal.

PROCESSOR AND WASTE COLLECTOR RECOMMENDATIONS

During each interview, RRS asked processors and waste collectors to provide their recommendations regarding how the State could support their operations. Below are the recommendations the processors and waste collectors provided.

- Processors want the State and New York State legislature to fully understand the current recycling systems and infrastructure in the State before passing an EPR policy and support the work the NYSDEC is doing to complete a statewide needs assessment for New York State. They want to ensure that the State understands the difficulty of keeping recycling streams clean with current rules of material acceptance.

- Processors have questions regarding what waste diversion rules, ordinances, and laws are in place across New York State and how those are currently being enforced. They indicated that a streamlining of these rules for consistency would help their businesses.

- Processors expressed interest in more support for end-market development in the region, particularly around glass. RHRFs are struggling with high contamination rates in single-stream recycling due to glass and lack of end markets. Investments in processing capabilities and end-market development would be helpful.

CONCLUSIONS AND KEY RECOMMENDATIONS

While this report represents a solid first step toward a statewide needs assessment of the recycling systems for packaging and paper products in New York State, it clearly demonstrates that much of the data to fully assess the current state of the recycling systems in New York are not currently available. To fill the data gaps and chart the course toward a modern, effective recycling system will require continued research and data gathering, supported by improved contracting, and reporting systems.

Stakeholders interviewed for this project showed great interest and engagement in this process. The State should continue to engage stakeholders in each step of the needs assessment process to ensure full participation and robust recommendations. Stakeholder engagement will be key to gathering the necessary data, improving processes, and ultimately enhancing the performance of the recycling system.

Moving forward, and looking beyond the Needs Assessment, the state should build a more robust data reporting and tracking system so that the data identified above can be gathered and analyzed on a regular basis to track progress toward the state's waste reduction and recycling goals for packaging and paper products, as well as other materials. This may require additional statutory or regulatory authority granted to NYSDEC or to local governments and /or planning units to require reporting.

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APPENDIX A

New York State Recycling Services and Infrastructure Needs Assessment Scope of Work

INTRODUCTION

The New York State Center for Sustainable Materials Management seeks a consultant to (1) define the current state of the state's recycling system for packaging and paper products and (2) identify what gaps need to be filled to achieve a best-in-class recycling system that meets the objectives outlined in the state's 2023 solid waste management plan and (3) describe the system improvements, including collection, processing, and education, and estimate the associated costs needed to achieve the state goals for municipal solid waste material recovery.

The Solid Waste Management Plan (SWMP) sets a goal to divert 85% of MSW materials generated in the state from disposal by 2050, with interim targets set at 40% by 2030 and 65% by 2040.

The final deliverable will provide data tables and visualizations that present the current conditions as well as the actions and improvements needed to establish and maintain the envisioned high-performing system. It will also include estimated costs to execute the actions and improvements identified and to the extent possible, who would bear those costs.

The contractor should describe a research approach that relies on as much actual data and information as possible and uses other methods to fill data gaps to complete the required deliverables. The following sources are available to the contractor:

- New York State Solid Waste Management Plan (SWMP)
- SUNY Stony Brook Composition Data
- Planning Unit Summaries (SWMP Appendix)
- Planning Unit Biennial Update Reports and Comprehensive Recycling Analysis (CRA) documents
- DEC Info Locator (https://gisservices.dec.ny.gov/gis/dil/) for facility locations and other information)
- Local recycling law information in DEC's records
- www.gis.ny.gov, the Civil Boundaries Program to provide access to statewide civil boundary GIS data that can serve as the foundation of civil boundaries and population
- Other data compiled by the New York State Center for Sustainable Materials Management

TASKS

PART 1: RECYCLING PROGRAMS

Develop a comprehensive summary of recycling services provided/offered/solicited to/by New York State residents and a summary of commercial/institutional recycling services. Through the collection and assembly of recycling-related data, the contractor should estimate per-household costs to collect residential recyclables, per-ton costs to process recyclables, or combined per-household costs to provide recycling collection and processing and estimate costs for commercial/institutional recycling services. Where insufficient cost information is available, the contractor should develop a cost estimate using identified assumptions about collection or self-transport of recyclables to a designated facility. Cost estimates should be reported by the community or planning unit to the extent possible and should be correlated to certain program or demographic factors where possible. Information gathered will be used to determine the gaps in program delivery, as well as the actions needed and associated costs to upgrade or add programs to achieve statewide recycling and waste reduction targets.

1. **Current level of residential recycling service**
    a. Municipal services provided directly by village, town, county, or planning unit as appropriate
        i. Single-Family Residential (1-4 family units)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
        ii. Multi-family residential (5 or more units)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
        iii. Other residential (e.g., mobile home parks, transitional housing, etc.)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
    b. Municipal services through contract by village, town, county, or planning unit as appropriate
        i. Single-Family Residential (1-4 family units)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
        ii. Multi-family residential (5 or more units)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
        iii. Other residential (e.g., mobile home parks, transitional housing, etc.)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
    c. Private / subscription services
        i. Single-Family Residential (1-4 family units)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
        ii. Multi-family residential (5 or more units)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
        iii. Other residential (e.g., mobile home parks, transitional housing, etc.)
            1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
            2. Cost data (per HH)
    d. Summary of residential service statewide
        i. Households served by curbside recycling
            1. Cost to municipalities and funding sources used
            2. Cost to residents/households
        ii. Households served by drop-off recycling
            1. Costs to municipalities and funding sources used
            2. Costs to residents/households
    e. Visualization of residential service data statewide
        i. Correlate program service data to key demographic, geographic and equity factors.

2. **Current level of commercial/institutional recycling service**
    a. Recycling services for commercial/institutional provided by village, town, county, or planning unit either directly or through contract, as appropriate.
        i. Access to recycling services and types of services provided (e.g., contracted, franchised, open market, other).

1. Commercial/institutional access to drop-off recycling

ii. Local, County, and State policies affecting the provision of commercial/institutional recycling services.

iii. Performance data
   1. Estimates of the amount generated/landfilled/combusted/recycled by material type; participation rates/contamination rates by jurisdiction where possible.

iv. Range of service costs

b. Private / subscription services
   i. Commercial
      1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
      2. Cost data (per establishment)
   ii. Institutional
      1. Performance data (amount recycled by material type/participation rates/ contamination rates/etc.)
      2. Cost data (per facility)

c. Summary of commercial/institutional service statewide
   i. Entities served by curbside recycling
      1. Cost to municipalities and funding sources used
      2. Cost to commercial establishments/institutions
   ii. Entities served by containerized recycling
      1. Costs to municipalities and funding sources used
      2. Costs to commercial establishments/institutions

d. Visualization of commercial/institutional service data statewide
   i. To the extent the data provides meaningful information, correlate program service data to key demographic, geographic, and equity factors.

3. Current level of recycling performance

a. Amount of each packaging and paper product category generated and recycled in New York State
b. Visualization of overall recycling performance data as well as subdivided into residential and commercial/institutional

4. Policies

a. To the extent possible, catalogue the recycling-specific policies in place in New York State municipalities.
b. Recommended policy approaches to manage commercially generated recyclable materials more effectively in NY State

5. Current level of education and outreach

a. To the extent possible, document municipal and private sector outreach and education efforts.

PART 2: RECYCLING AND COMPOSTING FACILITIES

Identify New York State recyclables handling/processing and composting facilities and collect information on their processing capacity, throughput, and capabilities. Information gathered will be used to determine the gaps in processing capacity and capabilities, and the actions needed and associated costs to upgrade or add facilities to achieve statewide recycling and waste reduction targets.

1. Recycling consolidation and processing capacity and capabilities

a. Create a list and map of consolidation facilities/transfer facilities and Recyclables Handling and Recovery Facilities (RHRFs) that accept packaging and paper products.
b. Collect information for each facility, including:

i. Ownership & operating structure (public, private, or publicly owned and privately operated)
ii. Operating capacity; identifying, where possible, if a facility is operating at or below design or permitted capacity, and whether physical space is available for expansion
iii. Service area/communities & transporters served
iv. Materials accepted
v. Contamination rates
vi. Proportion of throughput that is residential vs. commercial/institutional
vii. Sorting systems and technologies in use
viii. Commodities produced for sale to market
ix. Material end market information, by end-use type (e.g., packaging, automotive, textile, etc.) and region
x. Use and role of brokers to manage outgoing material, including amount, type and destination of material being managed

c. Present information by facility, if possible, or by proportion of statewide capacity if data is incomplete or if confidentiality must be maintained.

2. **Packaging and paper product composting facilities**
   a. Identify composting facilities serving New York State communities that accept packaging and/or paper products.
      i. Define the capacity and capabilities of each facility identified, identifying, where possible, if a facility is operating at or below design or permitted capacity, and whether physical space is available for expansion
      ii. Define ownership and operating structure (public, private, or publicly owned and privately operated)
      iii. Service area/communities & transporters served

PART 3: REUSE AND REFILL

Identify primary and secondary packaging reuse and refill programs and schemes in operation in New York State. Define the participating facilities and volumes handled.

1. **Packaging reuse/refill programs**
   a. Identify public and private packaging reuse programs, including both pilot and commercial scale.
   b. Gather information on:
      i. materials handled (type and amount)
      ii. markets/entities serviced
      iii. geographic area served

2. **Packaging reuse/refill facilities**
   a. Determine capacity and capabilities of existing packaging reuse facilities serving New York State
      i. Determine if additional authorized capacity or space is available to expand

3. **Data visualization**
   a. Map information on programs and facilities correlated to program or demographic information to the extent relevant

PART 4: GHG AND EMPLOYMENT IMPACTS

Define the GHG and employment impacts of existing recycling and reuse programs and facilities.

1. **GHG impact of current recycling collection and processing**
   a. Using data gathered in Parts 1, 2, and 3 and additional research proposed by the contractor, estimate the GHG impact of recycling collection.

2. **Employment impact of recycling and reuse**

a. Based on the data collected in Parts 1, 2, and 3 and additional research proposed by the contractor, estimate the number of jobs supported through existing recycling collection, transportation, and sorting for end markets. To the extent possible, identify the job class/wage levels, and whether jobs are unionized.

Part 5: Commodity Markets
Define commodities that are commonly recycled in New York State and the packaging and paper product categories that are included in those commodities and include an analysis of any regional variations. Identify emerging commodity markets that could accept packaging and paper product categories that are not currently recycled.

1. **Commodity grades and value**
    a. Charts/graphs presenting historical commodity pricing data for commonly recycled materials

2. **Materials commonly recycled in New York State**
    a. Percentage of recycling programs that accept each material
    b. Proportion of the statewide recycling sorting capacity that accepts each material
        i. Identify any differentiation by region of the state
    c. Mapping of packaging and paper product categories to material/commodity categories
    d. Proposal for statewide minimum list of packaging and paper product recyclable materials

3. **Emerging markets/market development opportunities**
    a. Barriers and opportunities to the development of markets for emerging commodity grades
    b. Mapping of packaging and paper product categories to emerging commodity grades

PART 6: OPTIONS FOR ACHIEVING DESIRED FUTURE STATE

Compare best practices utilized in high-performing recycling systems in the U.S. and Canada with current New York State conditions to identify service and infrastructure gaps that need to be filled. Note that this analysis will provide separate evaluations for residential recycling services, including single-family, multi-family, and other residential generators and commercial/institutional recycling services.

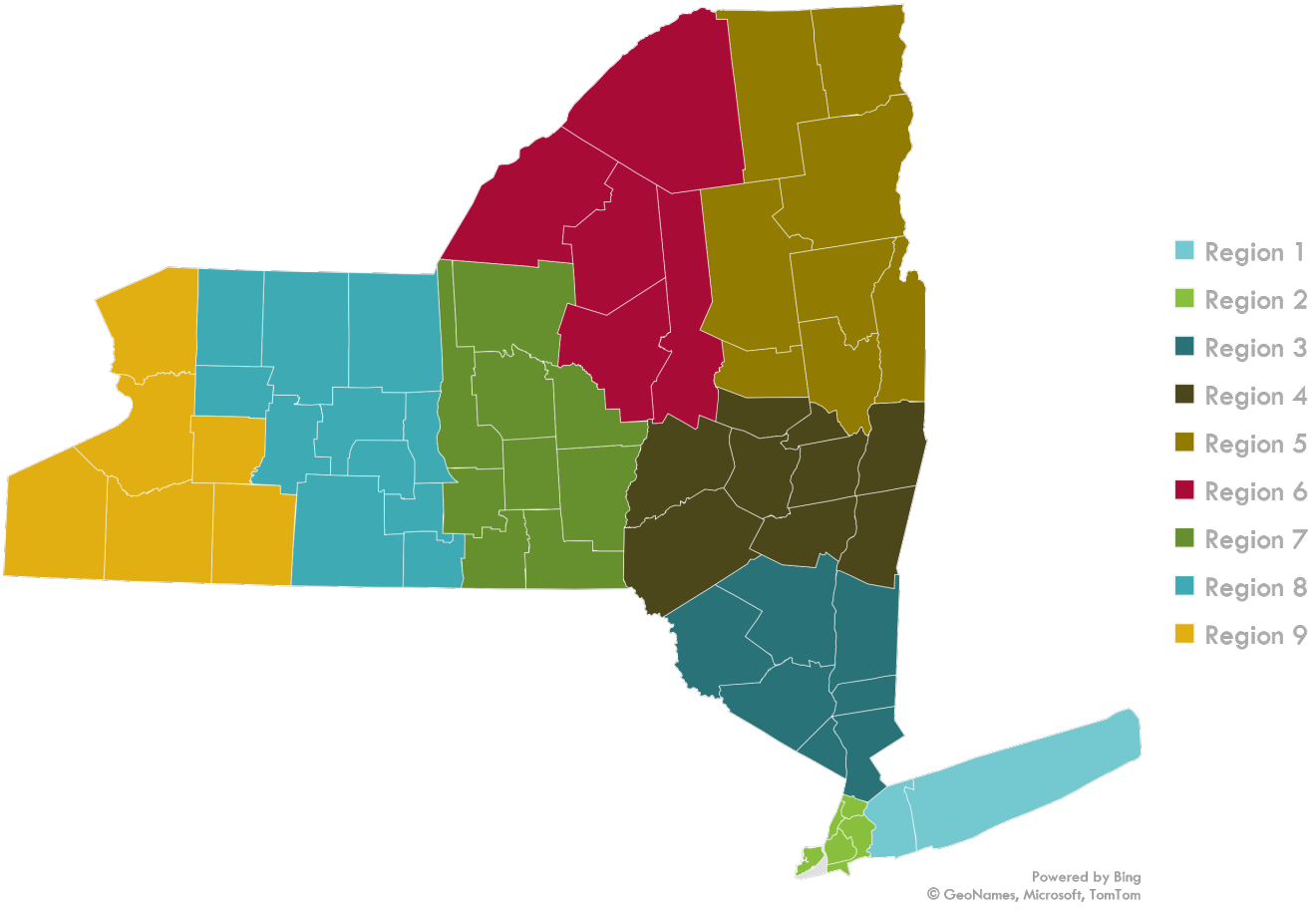
1. **Best practices for high-performing systems**
    a. Laws/policies
    b. Service levels
    c. Education/outreach
    d. Funding levels/sources
    e. Equity practices
    f. Innovative Technologies

2. **Desired future state**
    a. Three scenarios to achieve desired future state
        i. Materials/categories collected for recycling under each scenario
        ii. Materials/categories designated for composting under each scenario
        iii. Materials/categories targeted for reuse under each scenario
        iv. GHG impacts/implications of each scenario
    b. Improvements needed to achieve each scenario
        i. Cost of improvements needed to achieve each scenario (including capital and operating)
            1. Education/outreach
            2. Collection and sorting equipment/infrastructure (including emerging technology)
        ii. Employment impacts of improvements needed
    c. Visualization of scenarios to achieve desired future state

APPENDIX B

Map of New York State Department of Environmental Conservation Regions

Figure 8. NYSDEC Regions



APPENDIX C

Validation of Available Community Recycling Program Data

In addition to the 2023 New York State Solid Waste Management Plan with the hundreds of pages of data and information in the Appendices, the Center for Sustainable Materials Management provided RRS with several spreadsheet data sources on recycling programs in New York State. A description of each source is provided below. RRS worked to verify the data from each source with online resources and, in some cases, verified through stakeholder interviews. All of these datasets were static from a specific moment in time.

Data Available

Type of Service – The spreadsheet titled, "Collection method by Planning Unit." includes residential MSW collection methods and residential recycling systems. The spreadsheet indicates the percentage of the population living in single-family through four-unit and multi-family units as well as the percentage of the population that receives MSW collection via municipal collection, municipally contracted, or private subscription, the percentage of the population with single or dual-stream recycling collection, and the percentage of the population with residential MSW and recycling drop-off available.

Program Acceptance – A series of spreadsheets that detail materials accepted in curbside programs across New York State at that time. For each tracked municipality, a 0 or 1 is used to indicate if the specific material such as mixed paper, corrugated cardboard, plastic #1, plastic #2, etc. are either denied or accepted in the program, respectively. The Program Acceptance spreadsheet includes 1,664 municipalities.

Program Recycling Information – The spreadsheet titled, "NYS_Local_Programs," provided information on recycling contacts, recycling program URL links, whether a recycling program was single- or dual-stream, some information on commodities accepted, and the level of education and outreach – such as whether the communication contained images and what the design level of the website was – fair, good, moderate.

Long Island Profiles – The State University of New York at Stony Brook provided RRS with a series of ten Word document profiles detailing information on solid waste and recycling and organics collection programs for Long Island communities that were part of waste characterization data collection.

TYPE OF SERVICE SPREADSHEET REVIEW PROCESS

The type of service spreadsheet provided to RRS by the Center for Sustainable Materials Management contained information on whether curbside recycling collection is single- or dual-stream and whether a community has a drop-off recycling program. RRS verified this information for 26 of the roughly 250 municipalities and counties detailed in the spreadsheet (~10 percent) and (~ 1.5 percent of the 1,664 municipalities in the Program acceptance spreadsheet.

Collection Type – Single- or Dual-Stream

Of the 26 municipalities examined in detail, the type of service spreadsheet indicated that 21 of them were single-stream curbside recycling programs and five were dual-stream curbside recycling programs. In the web-based verification process, RRS was able to confirm that 13 communities had single-stream recycling programs and five had dual-stream. For three communities, guidelines providing instructions on whether to commingle or separate recycling could not be found online, and for five communities, RRS could find no web-based evidence of a curbside recycling program however, in addition to website information, NYSDEC also obtained their information from LSWMPs and biennial updates as well as direct phone calls. (Table 18).

RRS found one program, the Village of Roslyn Harbor, which was listed as single-stream in the type of service spreadsheet, however at the time of verification, the online guidelines instructed residents to separate newspaper from bottles, cans, and plastics and to tie newspaper and flattened cardboard together (https://www.roslynharbor.org/garbage-recycling).

Table 18: Comparison of Type of Service Spreadsheet and Online Community Verification

Method of Collection	Community Data: Type of Service Spreadsheet	Community Data: Online Verification
Single-stream	21	13
Dual-stream	5	5
Online guidelines not found	0	3
No program found	0	5
Total	**26**	**26**

Drop-off Program Availability

The type of service spreadsheet showed that 15 of the 26 programs had a drop-off recycling program. RRS was able to verify 13 drop-off recycling programs via web-based research. The Village of Plandome was listed as not having a drop-off program in the Type of Service spreadsheet, however, RRS was able to confirm via web-based research that at the time of verification, residents have access to a drop-off program. RRS was unable to confirm access to a drop-off recycling program in only three programs listed as having a drop-off program in the type of service spreadsheet.

Key Findings

A difference between the type of service spreadsheet and the web-based verification suggests that either there is a disconnect between the program operations and the information being conveyed to residents about how to recycle or the program has changed since the spreadsheet was compiled. For example, instances where RRS was unable to confirm whether residents had access to a curbside program could indicate the locality does not have access to a program, or alternatively that information on the program available is not easily found online. Residents may find out about a curbside recycling program when speaking with a waste collector regarding establishing a private subscription waste service, or with "move-in" information provided by the municipality. To definitively determine where curbside access is and is not available, outreach to recycling programs and private waste collectors is necessary. Nonetheless, a lack of online information about recycling programs may mean that residents will struggle to find the information needed to participate – a large obstacle to the foundational success of any recovery program.

The type of service spreadsheet included information on planning units. RRS used web-based and stakeholder-engagement-based research to verify some of the data included.

Table 19 references each planning unit assessed in the type of service spreadsheet, the information that was provided to RRS as the initial data, and the web-based verification findings.

Table 19: Type of Service Spreadsheet Verification Table

Planning Unit	County	Initial Information – Collection Type	Web-Based Verification Findings – Collection Type	Initial Data Information – Drop-Off Availability	Web-Based Verification Findings – Drop-Off Availability
Town of Brookhaven	Suffolk	Dual-stream	Dual-stream (with fiber and containers collected separately)	No program	No drop-off program found
Town of Huntington	Suffolk	Dual-stream	Dual-stream (with fiber and containers collected separately)	Drop-off recycling program	Permanent drop-off
Town of Southampton	Suffolk	Single-stream	Online guidelines not found	Drop-off recycling program	Permanent drop-off
Town of Southold	Suffolk	Single-stream	Online guidelines not found	Drop-off recycling program	Permanent drop-off
Village of New Hyde Park	Nassau	Dual-stream	Dual-stream (with fiber and containers collected separately)	No program	No drop-off program found
Village of Mineola	Nassau	Single-stream	Single-stream	No program	No drop-off program found
Village of Plandome Manor	Nassau	Dual-stream	Dual-stream (with fiber and containers collected separately)	No program	Permanent drop-off
Village of Old Westbury	Nassau	Single-stream	Single-stream	No program	No drop-off program found
Village of Roslyn Harbor	Nassau	Single-stream	Dual-stream (with fiber and containers collected separately)	No program	No drop-off program found
Village of Upper Brookville	Nassau	Single-stream	Online guidelines not found	No program	No drop-off program found
Village of Voorheesville	Albany	Single-stream	Single-stream	No program	No drop-off program found
The City of Albany	Albany	Single-stream	Single-stream	No program	No drop-off program found

Planning Unit	County	Initial Information – Collection Type	Web-Based Verification Findings – Collection Type	Initial Data Information – Drop-Off Availability	Web-Based Verification Findings – Drop-Off Availability
Village of Ravena	Albany	Single-stream	No curbside program found	No program	No drop-off program found
Town of Berlin	Rensselaer	Dual-stream	No curbside program found	Drop-off recycling program	Permanent drop-off
Bellmont	Franklin	Single-stream	No curbside program found	Drop-off recycling program	Permanent drop-off
Brushton	Franklin	Single-stream	Single-stream	Drop-off recycling program	Permanent drop-off
Burke	Franklin	Single-stream	Single-stream	Drop-off recycling program	Permanent drop-off
Duane	Franklin	Single-stream	No curbside program found	Drop-off recycling program	No drop-off program found
Town of Salisbury	Herkimer	Single-stream	Single-stream	Drop-off recycling program	Permanent drop-off
Village of Herkimer	Herkimer	Single-stream	Single-stream	Drop-off recycling program	Permanent drop-off
Elbridge, Town of	Onondaga	Single-stream	Single-stream	Drop-off recycling program	Permanent drop-off
Fayetteville, Village of	Onondaga	Single-stream	Single-stream	Drop-off recycling program	Permanent drop-off
City of Lackawanna	Erie	Single-stream	Drop-off Recycling program	Single-stream	No drop-off program found
Town of Marilla	Erie	Single-stream	Drop-off Recycling program	No curbside program found	Permanent drop-off
Town of West Seneca	Erie	Single-stream	Drop-off Recycling program	Single-stream	No drop-off program found
Village of Kenmore	Erie	Single-stream	No program	Single-stream	No drop-off program found

PROGRAM ACCEPTANCE AND RECYCLING INFORMATION SPREADSHEET VALIDATION PROCESS

RRS assessed online program information for 168 randomly selected programs from the program acceptance spreadsheet (~10 percent of total programs) to determine if the education information conveyed to residents via online information matched with the program acceptance data. As with the type of service spreadsheet, a mismatch in the program acceptance spreadsheet and online education information may indicate there may be a disconnect in the collected data and what residents may understand is recyclable in their area or the programs may have changed. Online communication is considered a primary avenue in which residents interact with their recycling program. Therefore, the ease for residents, businesses, and institutions finding recycling guidelines and the level of detail and clarity on how to recycle properly is essential to successful programs (Foodservice Packaging Institute 2022). Table 20 through Table 23 provide a summary of the comparison between the program acceptance spreadsheet and the web-based program research RRS conducted.

In instances where a curbside recycling program was found, but online recycling guidelines could not be identified or guidelines were so vague that a material's acceptance or denial could not be determined, the material was marked in the tables as acceptance could not be confirmed. For example, one municipal program indicated they had a single-stream curbside recycling program with weekly collection and asked residents to place "paper, plastic, cardboard, cans, etc." into their recycling stream. In this instance, RRS could not determine definitively from online information whether glass was accepted or denied in this program.

Where residents may have access to curbside recycling through a private subscription with one of multiple possible waste collectors, simple acceptance or denial of material could not be easily confirmed, and materials were marked as having a mismatch due to multiple guidelines. Solutions to clarify these data could be suggested through the statewide needs assessment process or required through State regulation. Best practice would dictate that there is a one-stop site online for a resident living in a specific village, hamlet, town, city, or county to determine what type of program they have, how they can sign up (preferably electronically) for service, and what they can and can't recycle using images for greater understanding.

Finally, in the communities researched, RRS could not find online evidence of a curbside recycling program for 25 municipalities that were marked as having curbside recycling in the program acceptance spreadsheet. As mentioned above, this does not necessarily mean that residents do not have access to curbside recycling, as finding private subscription service information can be challenging online. It may be that if residents at a specific address were to call local waste collectors, a curbside recycling program would be available.

Table 20: Comparison Matrix of Program Acceptance Data and Web-Based Program Research: Glass

	Clear Glass	Green Glass	Amber / Brown Glass
Match	47	41	40
Mismatch			
Glass accepted, with implicit acceptance of all colors	70	73	74
Multiple recycling guidelines from multiple waste collectors	9	9	9
Glass acceptance could not be confirmed	14	14	14
No curbside program found	25	25	25
Waste collector denies glass but program acceptance spreadsheet indicates acceptance	3	6	6
Total	**168**	**168**	**168**
Percent match	**27%**	**24%**	**23%**
Percent mismatch	**73%**	**76%**	**77%**

RRS found an exact match for glass acceptance between the program acceptance spreadsheet and the online communication to residents in 23 percent to 27 percent of the programs researched. An exact match means that the online community education information specified glass forms and colors accepted, such as clear, green, and brown glass bottles and jars. A mismatch in glass acceptance was found in 73 percent to 77 percent of programs.

The largest category of mismatches for glass occurred because many curbside recycling programs tell residents to recycle their bottles and jars but do not indicate the acceptance of specific colors of glass. In these instances, a resident may infer that any color glass bottle or jar is recyclable from the guidelines, however, this is not part of the explicit communication. In the online verification process, RRS differentiated materials based on explicit and implicit acceptance, and this differentiation caused the mismatches between the online verification and the program acceptance spreadsheet.

The acceptance of glass could not be determined for six communities with multiple waste collectors operating where the waste collector acceptance lists varied. Additionally, in 16 communities a curbside recycling program was found, but guidelines could not be found indicating whether glass is accepted in the program.

Finally, a true mismatch meaning the waste collector denied the specific glass color while the program acceptance spreadsheet indicated that glass color was accepted, occurred in three programs for clear glass and six programs for both green and brown glass. It is important to note here that the program acceptance spreadsheet specifies the possible different colors of glass accepted.

Table 21: Comparison Matrix of Program Acceptance Data and Web-Based Program Research: Metal

	Metal Cans
Match	89
Metal accepted, with implicit acceptance of all types of cans	34
Multiple recycling guidelines from multiple waste collectors	9
Metal acceptance could not be confirmed	11
Metal listed as accepted online, but not in program acceptance spreadsheet	0
No curbside program found	25
Total	**168**
Percent match	**52%**
Percent mismatch	**48%**

The metal cans category in the program acceptance spreadsheet was challenging to validate because the term metal cans is vague. For example, there are multiple types of metal cans including aluminum, steel, tin, bi-metal, and aerosol cans, and it was not clear which specific metal cans are being considered in the program acceptance spreadsheet. RRS looked for an exact match between metal cans and recycling programs communicating that aluminum cans were accepted since metal cans are widely used and recycled packaging. An exact match between online recycling communication and the program acceptance spreadsheet for metal cans was found in more than half, 52 percent, of programs researched, and a mismatch was found in 48 percent of researched programs. The largest mismatches for cans, 35 programs, occurred due to metal in general being accepted, but the specific details being communicated to residents did not provide a clear indication around the types of metal cans accepted. RRS assumed this would indicate implicit rather than explicit acceptance of all cans, meaning a resident would likely infer that all types of cans are accepted.

Multiple recycling guidelines for a program due to multiple waste collectors made it difficult to discern metal can acceptance definitively for nine programs.

Finally, in 11 programs, metal acceptance could not be confirmed due to the lack of online guidelines for the programs.

Table 22: Comparison Matrix of Program Acceptance Data and Web-Based Program Research: Paper

	Mixed Paper	OCC	Junk Mail	Magazines	News-paper	Office Paper	Boxboard
Match	68	94	81	83	89	105	53
Mismatch							
Paper accepted, but types of paper unspecified	4	31	43	41	35	3	71
Multiple recycling guidelines from multiple waste collectors	9	9	9	9	9	9	9
Paper acceptance could not be confirmed	9	9	9	9	9	9	9
Material accepted in the program but not in the program acceptance spreadsheet	53	0	1	1	1	17	1
No curbside program found	25	25	25	25	25	25	25
Total	**168**	**168**	**168**	**168**	**168**	**168**	**168**
Percent match	**40%**	**56%**	**48%**	**49%**	**53%**	**62%**	**32%**
Percent mismatch	**60%**	**44%**	**52%**	**51%**	**47%**	**38%**	**68%**

Matching paper acceptance communicated to residents online with the acceptance information in the program acceptance spreadsheet was the most variable material researched. Matches between the online verification and the program acceptance spreadsheet ranged from 32 percent for boxboard to 62 percent for office paper. Office paper had the highest matches due to it being indicated as highly accepted in the program acceptance spreadsheet and paper being an extremely common description given to residents for recycling guidelines even in the sparsest of communications. Boxboard had the fewest matches most often because this material was indicated as accepted in the program acceptance spreadsheet, but not mentioned in online communications.

For all materials except mixed paper, the largest source of mismatches occurred due to paper being accepted in the program, but the online communications not being descriptive enough to verify the material acceptance with the program acceptance spreadsheet. For example, in 31 programs, a mismatch occurred where corrugated cardboard was indicated as accepted in the program acceptance spreadsheet, but online communication was not clear on whether corrugated cardboard was accepted in the curbside recycling program.

Multiple recycling guidelines made it difficult to definitively indicate the acceptance of materials in nine programs, and in another nine programs, paper acceptance could not be confirmed because recycling guidelines were not found online.

In 52 programs, RRS found that mixed paper was likely accepted based on online communications to residents, whereas the program acceptance spreadsheet indicated mixed paper was not accepted.

Table 23: Comparison Matrix of Program Acceptance Data and Web-Based Program Research: Plastic

	#1	#2	#3	#4	#5	#6	#7
Match	50	41	32	26	37	27	28
Mismatch							
Plastic accepted, but resin codes not used in description or form description indicates only some shapes and resin code combinations are accepted	74	83	91	98	84	93	92
Plastic acceptance could not be confirmed	10	10	10	10	10	10	10
Multiple guidelines	9	9	9	9	9	9	9
No curbside program found	25	25	25	25	25	25	25
True mismatch	0	0	1	0	3	4	4
Total	**168**	**168**	**168**	**168**	**168**	**168**	**168**
Percent match	**30%**	**24%**	**18%**	**15%**	**21%**	**15%**	**16%**
Percent mismatch	**70%**	**76%**	**82%**	**85%**	**79%**	**85%**	**84%**

A match for plastic recycling between online recycling communications and the program acceptance spreadsheet was found in 15 percent to 30 percent of programs depending on the specific resin code, with resin code #1 having the highest match, and resin codes #4 and #6 having the lowest matches. Correspondingly, mismatches ranged from 70 percent to 85 percent.

The largest source of mismatches for the plastic materials occurred where plastic was accepted in the program, but the online communications did not use resin codes in the description of what materials were accepted, or the description of resin codes was accompanied with material forms. For example, many recycling programs instruct residents that plastic #1 and #2 bottles and jugs are recyclable but may not mention or explicitly deny plastic #1 thermoforms. In instances where resin codes were not used or a combination of resin codes and material form made it impossible to say plastic #1 was accepted, the program was labeled as having "plastic accepted but resin codes not used in the description or form description indicates only some shapes and resin code combinations are accepted".

In 10 programs, plastic acceptance could not be confirmed due to lack of online recycling guidelines.

Finally, in a handful of programs, there was a true mismatch between the program acceptance spreadsheet and the online communications. For resin codes #3, #6, and #7, one program was indicated as accepting these resins on the program acceptance spreadsheet, but the online communications explicitly denied these materials. For resin codes #5, #6, and #7, the program acceptance spreadsheet indicated these materials were not accepted in three programs, but online communication showed these materials as accepted.

Key Findings

The level of true mismatch between the program acceptance spreadsheet and online communication was extremely low, meaning instances where the spreadsheet denied a material that was indicated as accepted online or vice-versa were not common. However, mismatches due to differences in the program acceptance spreadsheet and how the curbside program was communicated to residents online, were high. A summary is provided below that describes the main sources of mismatches from the online research and spreadsheet.

- *Guidelines could not be found online* – In some instances, program information could not be found online even though it is clear there is a curbside recycling program. In these instances, RRS could not verify whether the information provided in the program acceptance spreadsheet was correct. There are a number of ways a program can perform outreach to residents including mailers and stickers on carts and bins, however web-based information on recycling programs is now considered a cornerstone of critical recycling education and outreach for programs.

- *Guidelines do not provide a level of specificity to determine material acceptance* – Guidelines can vary significantly in the level of specificity and material descriptions. Many programs or waste collectors may have guidelines that simply say the recycling program "accepts glass, metal, plastic containers, paper, cardboard, milk cartons, and juice containers." These guidelines do not provide enough information to assess the types of paper or which plastic resin codes and forms are accepted and not accepted.

Table 24 shows communication from two programs on materials accepted in the recycling program. Program two provides a significant amount more detail on materials accepted in the program than program one, making it easier to determine what truly is and is not accepted.

Table 24: Example of Different Levels of Communication on What is Accepted in Recycling Programs

Community Acceptance List	Glass	Plastic	Paper	Metal
1	Glass	Plastic containers	Paper, cardboard, milk carton and juice containers	Metal
2	Clear, brown, and green jars and bottles only	Food and beverage containers, detergent, and shampoo containers NO plastic bags, film expanded polystyrene, toys	Newspaper, magazines, catalogs, junk mail, manila folders, envelopes, brown paper bags, white colored notebook, fax paper, wrapping paper, cardboard boxes, pizza boxes, cereal boxes NO waxed covered cardboard	Tin, steep, and aluminum beverage cans, aluminum pans, clean foil NO pots, pans, bowls, utensils, cookware, hangers, or scrap metal

- *Guidelines are variable due to more than one waste collector operating* – Most areas in New York State rely on private companies that work directly with residents or municipalities to provide waste and recycling collection. In areas where recycling is provided on a private subscription basis, guidelines can vary depending on the specific waste collectors. This makes it difficult to create a universal list of accepted or not-accepted materials for the municipality or county.
    - *Example: Ulster County* – Residents of Ulster County must privately contract with commercial waste collectors to receive curbside waste and recycling collection. All licensed (by Ulster County) waste collectors are required to provide recycling services with waste collection and residents must request the service upon sign-up. The county's website lists 13 MSW waste collectors that residents can choose from. RRS examined the guidelines listed by four County licensed waste collectors in

the area and found differences in materials accepted. Most notably, plastic descriptions varied. One waste collector accepted plastic bottles, jugs, and tubs, which typically indicate resin codes #1, #2, and #5, and specifically excluded plastic clamshells which are typically resin codes #1 or #6. Another waste collector specifically stated resin codes #1-7 plastic bottles and food containers were accepted.

Table 25: Ulster County, NY Recycling Guidelines for Four Private Waste Collectors

Waste Collector	Glass	Plastic	Paper	Metal
Waste Collector 1	Clear, brown, green beverage bottles and food jars without lids NO broken glass, non-container glass	Plastic bottles, jugs, tubs, and prescription bottles. NO bulky rigid plastics, plastic bags, expanded polystyrene	Cardboard, egg cartons, paper, junk mail, kraft brown paper bags, magazines, catalogs, newspaper, paperback books, office and school paper, paperboard/ chipboard, beverage, cereal, pasta, clothing, and tissues boxes, telephone directories NO soiled, greasy, or wet paper	Aerosol cans, aluminum beverage cans, steel or tin beverage and food cans NO scrap metal
Waste Collector 2	Green, clear, and amber bottles and jars NO non-container glass	Bottles, jugs, jars, tubs, and lids NO clamshell packaging, plastics bags, expanded polystyrene, black plastic, single use service ware	News, office paper, junk mail, boxboard, corrugated cardboard NO pizza boxes or paper beverage cartons	Cans, lids, foil wrap, and foil trays
Waste Collector 3	Green, clear, and amber glass beverage and food bottles NO non-container glass	Plastic beverage bottles and food containers resins #1-7 NO expanded polystyrene	Newspaper, catalogs, magazines, telephone books, cardboard, egg crates shoes boxes, cereal boxes, white and colored paper, folders, junk mail, shredded paper NO dirty paper towels or tissues	Aluminum, steel, and aerosol cans NO appliances
Waste Collector 4	Green, clear, and amber glass bottles, jars, and beverage containers NO glass items	Plastic containers #1-7 bottles, yogurt containers, detergent jugs, empty 5-gallon plastic buckets NO expanded polystyrene, plastic bags, plastic toys	Corrugated cardboard, kraft bags, mixed paper, magazines, junk mail, catalogs, cereal boxes, TV dinner cartons, paper milk and beverage cartons, aseptic drink boxes, books, paper towel and toilet paper tubes, printed paper NO waxed paper or cardboard, carbon paper	Steel cans, soup cans, cookie tins, empty aerosol cans, pet food and vegetable cans

PROGRAM RECYCLING INFORMATION SPREADSHEET VALIDATION PROCESS

The program recycling information spreadsheet provided some additional information on recycling programs for 91 recycling programs across the State, namely on what materials are accepted for recycling in the program. RRS examined the program recycling information in detail for three recycling programs on the spreadsheet. The findings from three cases of town programs are described below:

- *Town Case #1* – The program recycling information spreadsheet indicated that recycling in the Town of Huntington was dual-stream, with glass and plastic resin codes 1, 2, 3, 4, 5, and 7 accepted. The spreadsheet indicated it was unclear if pizza boxes were accepted in the program. The RRS web-based review found that this information was generally correct with a few exceptions. First, plastic resin code information needs to include form (distinguishing rigid from flexible formats). For example, plastic bags are prohibited (#4). RRS also found that the directions to residents specifically denied pizza boxes.

- *Town Case #2* – The program recycling information spreadsheet indicated that recycling in the Town of Brookhaven was dual-stream, with glass only accepted at drop-off. Plastic resin codes 1, 2, and 5 are accepted. Pizza boxes were indicated as not accepted. The RRS web-based review found that the plastic recycling information conveyed to residents included a description stating plastic #1 water/soda bottles were accepted but made no mention of plastic #1 clamshells as being accepted. The online information did not directly mention pizza boxes but specified no soiled cardboard was accepted.

- *Town Case #3* – The program recycling information spreadsheet indicated that recycling in the Town of Southampton was single-stream with glass and plastic resin codes #1 and #2 accepted. The acceptance of pizza boxes was unclear. The RRS web-based review found that this program was only drop-off recycling, which was not made clear in the spreadsheet. The material acceptance information all appeared to be correct. The guidelines do specify that only flattened cardboard boxes are accepted, which is ambiguous in its indication of the acceptability of pizza boxes.

Key Findings

There is not enough detail captured in the program recycling information spreadsheet to truly assess a recycling program. For example, the spreadsheet does not differentiate between curbside and drop-off programs, and the accepted materials for collection can differ in these two contexts. Additionally, the data is structured only by plastic resin code numbers, without any indication of the form or format of material accepted. This can make it difficult to map acceptance as described in educational materials with the spreadsheet, since the true situation for whether a particular resin may be "it depends" based on the format specifications. Furthermore, it is common for processors to have acceptance lists that consider both the resin code and form – bottle, tub, clamshell, bulky, rigid, flexible – of the plastic item.

LONG ISLAND PROFILES VALIDATION PROCESS

RRS reviewed the SUNY Stony Brook-provided, structured Word documents profiling the recycling programs of ten Long Island towns as well as the incorporated villages and hamlets within them that either use the town programs or manage their own.

Each profile contains:

- A map of the town and its incorporated jurisdictions as applicable
- Town characteristics, including population, population density, and land area
- A high-level narrative description of solid waste program districts, material flows, and funding sources
- A narrative description of MSW and recycling program delivery, service type, and collection frequency
- A list of solid waste facilities owned, operated, or contracted for within the town including drop-off sites, landfills, municipal waste combustors, and compost/organics management facilities, among others
- The department and contact person that oversees waste, recycling, and/or sanitation within the town

- An analysis of sanitation service disruptions (if any) due to the Coronavirus pandemic in 2020
- Summary tables describing material acceptance lists for curbside and drop-off programs for MSW, recycling, yard trimmings, household hazardous waste, and/or e-waste

Program information is presented uniformly across all the Long Island profiles studied, though some village- and hamlet-level program details are abbreviated. For instance, village profiles conform material acceptance information into a bank of standard codes such as "M" meaning "ferrous metal and aluminum," but do not capture more granular details on material formats such as "aluminum cans" or "empty aerosol cans" in the same way that is included in town profiles.

RRS systematically analyzed each profile and captured the recycling-specific information contained within them in a central database to facilitate data validation. From a random sample of five communities, RRS compared specific data points presented in the program profile against the information available to residents through program websites. In a handful of cases, profile information could not be validated because the community had no recycling information available on their website, or no website at all. Detailed comparison tables are included below.

Key Findings

RRS found a fair level of congruence between the program profiles and websites with respect to the quantity and quality of program information conveyed.

However, as evidenced by the tables below, the following items represent frequent incongruencies in which profiles omit specific information that is advertised by program websites:

- Number five plastic as an accepted material (likely due to a recent increase in acceptance and therefore not updating websites)
- Plastic acceptance by container shape (in addition to or as opposed to resin codes)
- Names of private waste collection companies utilized
- Complete addresses of recycling drop-off facilities

Multi-family and commercial service descriptions are also largely omitted from profiles and most program websites.

Table 26 through Table 30 compare the information provided in the Long Island recycling program profiles compared with the web-based verification findings.

Table 26: Village of Babylon Long Island Community Profile and Website Information

Program	Information Provided	Community Profile	Community Website
Curbside Recycling	**Service type**	Municipal	Municipal
	Service frequency	2-3/week (every other weekday)	5 times every two weeks (3 days one week, 2 days the next)
	Waste collector name	N/A	Village of Babylon Highway & Sanitation Department
	Containers used	N/A	blue recycling bin
	Collection type	N/A	N/A
	Multi-family units included	N/A	N/A
	Fiber accepted	N/A	Not specified
	Plastic accepted	Plastics	Plastics (except wrappers)
	Glass accepted	Glass	Glass
	Metal accepted	Ferrous metal and aluminum	Aluminum Cans
Drop-off Recycling*	**Facility owner**	Town of Babylon	N/A
	Facility operator	Town of Babylon	N/A
	Facility name	Residential recycling center	Residential Recycling Center
	Facility address	West Babylon	57 Field Street, West Babylon, NY 11704
	Fee structure	N/A	$100/ton or $20 minimum for passenger vehicles
	Access type	Permanent	Permanent
	Service type	Residents	Residents (proof required)
	Collection type	N/A	N/A
	Fiber accepted	Cardboard Newspaper Junk mail Telephone books Computer paper	Cardboard Newspapers Junk mail Magazines Telephone books/books
	Plastic accepted	Plastics Polystyrene	Plastic containers
	Glass accepted	Glass	Glass
	Metal accepted	Aluminum cans	White goods Aluminum Cans

** Profile gives no indication that villages have access to Town drop-off center, though Village website advertises it.*

Table 27: Village of Lake Grove Long Island Community Profile and Website Information

Program	Information Provided	Community Profile	Community Website
Curbside Recycling	**Service type**	Private	N/A
	Service frequency	1/week	1/week (paper materials one week, containers the next)
	Waste collector name	N/A	N/A
	Containers used	N/A	N/A
	Collection type	Dual-stream	Dual-stream
	Multi-family units included	N/A	N/A
	Fiber accepted	Newsprint Corrugated cardboard Mixed paper Magazines Brown paper bags	Newspaper Copy paper Magazines Colored Inserts Corrugated and non-corrugated carboard
	Plastic accepted	#1 & #2 Plastics	Plastics #1, #2, & #5 Water/soda bottles Milk jugs Detergent bottles Tubs of yogurt, margarine
	Glass accepted	Not accepted	Not accepted
	Metal accepted	Ferrous metal and aluminum	Tin, aluminum & bimetallic cans Empty aerosol spray cans
Drop-off Recycling*	**Facility owner**	N/A	N/A
	Facility operator	Town of Brookhaven	N/A
	Facility name	Brookhaven Waste Management Facility	N/A
	Facility address	Hamlet of Brookhaven	N/A
	Fee structure	N/A	N/A
	Access type	Permanent	N/A
	Service type	Residential	N/A
	Collection type (single, double stream etc.)	N/A	N/A
	Fiber accepted	"Recyclables"	N/A
	Plastic accepted	"Recyclables"	N/A
	Glass accepted	Glass	N/A
	Metal accepted	"Recyclables" Scrap metal	N/A

** The Town profile only indicates that "most villages" advertise the town drop-off center for glass.*

Table 28: Village of Islandia Long Island Community Profile and Website Information

Program	Information Provided	Community Profile	Community Website
Curbside Recycling	**Service type**	Private	N/A
	Service frequency	1/week	1/week (paper materials one week, containers the next)
	Waste collector name	N/A	N/A
	Containers used	N/A	N/A
	Collection type	Dual-stream	Dual-stream
	Multi-family units included	N/A	N/A
	Fiber accepted	Newsprint Cardboard	Paper Newspapers
	Plastic accepted	Plastics	Plastic
	Glass accepted	Glass	Glass
	Metal accepted	Ferrous metal and aluminum	Metal
Drop-off Recycling	**Facility owner**	N/A	N/A
	Facility operator	N/A	N/A
	Facility name	N/A	N/A
	Facility address	N/A	N/A
	Fee structure	N/A	N/A
	Access type	N/A	N/A
	Service type	N/A	N/A
	Collection type (single, double stream etc.)	N/A	N/A
	Fiber accepted	N/A	N/A
	Plastic accepted	N/A	N/A
	Glass accepted	N/A	N/A
	Metal accepted	N/A	N/A

Table 29. Town of Smithtown Long Island Community Profile and Website Information

Program	Information Provided	Community Profile	Community Website
Curbside Recycling	**Service type**	Private (multiple waste collectors)	Private (multiple haulers)
	Service frequency	1/week (paper materials one week, containers the next)	1/week (paper materials one week, containers the next)
	Waste collector name	N/A	Alpha Carting Brothers Waste T&D Doherty Total Collection Winters Bros
	Containers used	Recycling bin provided for a fee. Residents may also buy their own buckets and affix a Town recycling sticker.	32-gallon max. containers
	Collection type	Dual-stream	Dual-stream
	Multi-family units included	N/A	N/A
	Fiber accepted	Newspaper Copy paper Corrugated cardboard Magazines Colored inserts	Newspaper Copy paper Corrugated cardboard Magazines Colored inserts
	Plastic accepted	#1 & #2 Plastics	#1 & #2 Plastics Water/soda bottles Milk jugs Detergent bottles
	Glass accepted	Not accepted	Glass bottles
	Metal accepted	Metal cans Empty aerosol spray cans	Tin, aluminum, & bimetallic cans Empty aerosol spray cans
Drop-off Recycling	**Facility owner**	N/A	N/A
	Facility operator	Town of Smithtown	N/A
	Facility name	Smithtown Municipal Services Facility	Smithtown Municipal Services Facility
	Facility address	Kings Park	85 Old Northport Road, Kings Park
	Fee structure	N/A	N/A
	Access type	Permanent	Permanent Monday - Saturday, 7:00 AM to 11:45 AM and 12:45 PM to 3:15 PM
	Service type	Residential	Residential
	Collection type (single, double stream etc.)	Likely double stream: "Paper materials go to a LI paper broker and containers are sent to recycling vendors..."	N/A
	Fiber accepted	"Recyclables"	Paper, cardboard
	Plastic accepted	"Recyclables"	Recyclable plastics
	Glass accepted	Glass bottles – self sorted by color	Recyclable glass
	Metal accepted	"Recyclables" Scrap metal	Scrap metal

Table 30: Town of Riverhead Long Island Community Profile and Website Information

Program	Information Provided	Community Profile	Community Website
Curbside Recycling	**Service type**	Private	Private
	Service frequency	1/week (paper is collected one week and containers the next week)	1/week (paper is collected one week and containers the next week)
	Waste collector name	European American Waste Disposal	European American Waste Disposal
	Containers used	Unspecified. Town decal provided for containers (2 decals/household/year)	N/A
	Collection type	Dual-stream	Dual-stream
	Multi-family units included	No	N/A
	Fiber accepted	Newspaper Copy paper Corrugated cardboard Magazines Junk mail Telephone books Catalogs	Newspaper Copy paper All cardboard products Magazines, Telephone books Books (hard covers removed)
	Plastic accepted	#1 & #2 Plastics	Plastics #1, #2 & #5 Plastics
	Glass accepted	Glass	Glass
	Metal accepted	Metal cans	Cans
Drop-off Recycling	**Facility owner**	N/A	N/A
	Facility operator	N/A	N/A
	Facility name	N/A	N/A
	Facility address	N/A	N/A
	Fee structure	N/A	N/A
	Access type	N/A	N/A
	Service type	N/A	N/A
	Collection type (single, double stream etc.)	N/A	N/A
	Fiber accepted	N/A	N/A
	Plastic accepted	N/A	N/A
	Glass accepted	N/A	N/A
	Metal accepted	N/A	N/A

CONNECTING COMMUNITIES USING THE SAME RECYCLING PROGRAM WITH PROGRAM IDS

Connecting communities using the same recycling program with program IDs, recycling programs can be established at the county, town, city, hamlet, village, or waste authority level. To ensure correct tracking of recycling programs, through the future needs assessment effort, all communities within each county in New York could be tracked by the US Census and indicating communities that share recycling programs using the Recycling Program ID. For example, in Rensselaer County, NY there are seven communities that are part of the Eastern Rensselaer County Solid Waste Management Authority (ERCSWMA), and all these communities are connected under one recycling program. So, for example, the Recycling Program ID could identify these communities using a unique recycling program ID that is the same across the communities. Where communities have individual recycling programs, the Recycling Program ID is the same as the community's GeoID (Table 31).

Table 31. Example of Tracking All Communities in Rensselaer County by GeoID and Program ID

County Name	Full Name	GeoID	Recycling Program ID	Community Population	Notes
Rensselaer County	Averill Park CDP	3603320	3603320	1,693	
Rensselaer County	Berlin town	3608306189	3608306189	1,880	
Rensselaer County	Brunswick town	3608310275	3608310275	11,941	
Rensselaer County	Castleton-on-Hudson village	3612870	12345	1,473	ERCSWMA
Rensselaer County	East Greenbush CDP	3622106	3622106	4,487	
Rensselaer County	East Nassau village	3622557	3622557	587	
Rensselaer County	Grafton town	3608329674	3608329674	2,130	
Rensselaer County	Hampton Manor CDP	3631918	3631918	2,417	
Rensselaer County	Hoosick Falls village	3635474	12345	3,501	ERCSWMA
Rensselaer County	Nassau village	3649506	12345	1,133	ERCSWMA
Rensselaer County	Petersburgh town	3608357441	3608357441	1,525	
Rensselaer County	Poestenkill CDP	3658794	3658794	1,061	
Rensselaer County	Remainder of East Greenbush town	3608322117	3608322117	9,569	
Rensselaer County	Remainder of Hoosick town	3608335463	3608335463	3,423	
Rensselaer County	Remainder of Nassau town	3608349517	3608349517	3,133	
Rensselaer County	Remainder of North Greenbush town	3608352100	3608352100	8,799	
Rensselaer County	Remainder of Pittstown town	3608358398	12345	5,338	ERCSWMA
Rensselaer County	Remainder of Poestenkill town	3608358805	3608358805	3,469	
Rensselaer County	Remainder of Sand Lake town	3608365013	3608365013	4,177	
Rensselaer County	Remainder of Schaghticoke town	3608365486	12345	7,018	ERCSWMA
Rensselaer County	Remainder of Schodack town	3608365541	3608365541	11,257	
Rensselaer County	Rensselaer city	3608361148	3608361148	9,392	
Rensselaer County	Schaghticoke village	3665475	3665475	592	
Rensselaer County	Stephentown town	3608371102	12345	2,903	ERCSWMA
Rensselaer County	Troy city	3608375484	3608375484	50,129	
Rensselaer County	Valley Falls village	3676672	12345	466	ERCSWMA
Rensselaer County	West Sand Lake CDP	3680863	3680863	2,660	
Rensselaer County	Wynantskill CDP	3683349	3683349	3,276	