Maryland
Department of
the Environment

APPENDIX B

RESIDENTIAL RECYCLING STREAM ANALYSIS

FINAL NEEDS ASSESSMENT | MARYLAND STATEWIDE RECYCLING NEEDS ASSESSMENT

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1 Introduction

Understanding the programs, infrastructure, accessibility, and cost of recycling programs is critical to informing the future of recycling in Maryland. This technical memorandum describes the current state of Maryland's recycling and composting programs and infrastructure, utilizing desktop research and stakeholder survey data on access to services, customer costs, facilities, and education programs. For the purposes of this analysis, the recycling stream includes organics materials that are processed at composting or anaerobic digestion facilities.

1.1 Background

Recycling and composting program data from stakeholder interviews and surveys, Solid Waste Management Plan (SWMP) reviews, and other desktop research provide baseline information that enables modeling of a future state Extended Producer Responsibility (EPR) program for packaging in Maryland. The following sections describe Maryland's current single-family residential recycling and composting programs, processing and transfer facilities, and education efforts, which would serve as the foundation for a potential EPR program.

1.1.1 Maryland Recycling Act

The Maryland Recycling Act (MRA) outlines the types of waste that count toward a county's recycling rate. In 1988, the MRA (Chapter 536) mandated that Maryland reduce the overall amount of solid waste disposal in the State through improved management, education, and regulation. The 1988 MRA gave new responsibilities to jurisdictions in the State of Maryland to reduce the amount of solid waste disposed of by its Counties. Currently, a county with a population greater than 150,000 is required to recycle 35% or more of its waste, and a county with a population of less than 150,000 is required to recycle 20% or more of its waste.

MRA waste includes the following material[1]:

- **Compostables:** grass, leaves, wood waste, food waste
- **Glass:** containers, mixed glass, fluorescent light tubes
- **Metals:** aluminum cans, steel/tin cans, scrap, white goods
- **Paper:** corrugated cardboard, mixed paper, white paper, newspaper, books, phone books, shredded paper

[1] In 2021 the MRA altered the definition of 'recyclable materials' to exclude incinerator ash and repealed the authority of a county to utilize a resource recovery facility to meet 5% of the waste reduction required to be achieved through recycling in the county's recycling plan. The MRA excludes from its scope scrap metal, land clearing debris, construction and demolition debris, sewage sludge, hospital wastes, and waste generated by a single individual or business and disposed of in a facility dedicated solely for that entity's waste.

- **Plastic:** plastic bottles, mixed plastics, films, containers
- **Other Materials:** laser toner cartridges, lead-acid batteries, oil filters, wood pallets

Materials not considered recyclable under the MRA include:

- **Automobile components:** antifreeze, waste oil, and scrap automobiles
- **Construction/building materials:** asphalt, concrete, and wood
- **Other Materials:** coal ash, cleaning fluids, liquid crystal display, scrap metal, soils, and sewage sludge.

1.1.2 Maryland Solid Waste Management and Diversion Report

The Maryland Department of the Environment (MDE) submits the Maryland Solid Waste Management and Diversion Report (Report) to the Governor and General Assembly annually to describe how solid waste was managed in Maryland each year. The Report provides annual solid waste management data reported by permitted Solid Waste Acceptance Facilities to MDE, and annual waste diversion data reported by 24 counties (including City of Baltimore) to MDE. Solid Waste Acceptance Facilities include:

- Municipal, construction and demolition, industrial waste, and land clearing debris landfills
- Solid waste transfer stations
- Solid and medical waste processing facilities
- Solid waste processing facilities and transfer stations
- Municipal solid waste incinerator/waste-to-energy facilities
- Natural wood waste (NWW) recycling facilities
- Composting facilities.

The recycling data reported by the permitted Solid Waste Acceptance Facilities represents a small portion of the total waste diversion data as recycling facilities are not permitted by the State, requiring additional data to be reported by the Counties on an annual basis.

In addition to tonnage and diversion data, the report includes greenhouse gas emission and energy consumption information; sustainable materials management metrics and goals, recycling end market development, organics diversion, material bans, hard to recycle materials, educational resources, and partnerships.

1.2 Methodology

The Project Team developed a database comprised of information obtained from stakeholder surveys, interviews, and SWMP reviews to analyze county and municipality programs at the local and regional levels.

1.2.1 Stakeholder Surveys and Interviews

The Project Team conducted stakeholder interviews and developed and distributed electronic surveys. Information requested by surveys and interviews was used to supplement captured annually through MRA reporting. The Project Team engaged the following stakeholders:

Counties and Select Municipalities: Counties (including the City of Baltimore) and select municipalities, as identified by MDE, were engaged to participate in the Recycling Needs Assessment survey. The City of Baltimore is considered with the Counties for the purposes of this analysis due to its geographic size and population.

Material Recovery Facilities (MRFs). Recycling processing facilities in the State and those known to process material generated in Maryland but located outside the State were engaged through survey and interview. [2]

Recycling Haulers. A select group of haulers, identified by the National Waste and Recycling Association (NWRA), were engaged through a survey.

Composting Facilities. Composting facilities (both Tier I and II) facilities were engaged through survey.

Strategic Partners. Select entities including government/planning organizations (e.g., Northeast Maryland Waste Disposal Authority), economic development groups (e.g., Maryland Department of Commerce), environmental advocates (e.g., Sierra Club), waste management/recycling advocates (e.g., National Waste and Recycling Association), and industry/material representatives (e.g., American Forestry and Paper Association) were engaged to participate in interviews.

Combining the qualitative interview insights with quantitative survey results provides a more comprehensive analysis for evaluating the current recycling system and providing recommendations for enhancement in Maryland.

1.2.2 Solid Waste Management Plan Reviews

MDE requires each county to prepare and adopt a Solid Waste Management Plan (SWMP) that covers a ten-year planning period, pursuant to Environmental Article, Title 9, Subtitle 5 Annotated Code of Maryland and Code of Maryland Regulations 26.03.03. The SWMP must be both approved by MDE and adopted by the City Council. Most recent County and municipal governments' SWMPs were reviewed to compile baseline information to supplement information provided in the surveying effort. Table 1 identifies the SWMPs reviewed by the Project Team. Due to some county SWMPs having not been updated recently, survey data was relied on more for current system characteristics for these counties.

[2] This includes two (2) out of state MRFs that receive Maryland's recyclables. Two (2) additional facilities that transfer single stream and bale certain commodities were also surveyed, but not included in these numbers.

Table 1: Current County Solid Waste Management Plans

Region	County	Year
Western Maryland	Allegany	2021
	Garrett	2014
	Washington	2022
Washington Metro	Prince George's	2024
	Frederick	2018
	Montgomery	2020
Baltimore Metro	Anne Arundel	2024
	Baltimore	2019
	Carroll	2017
	City of Baltimore	2024
	Harford	2015
	Howard	2014
Southern Maryland	Calvert	2019
	Charles	2022
	St. Mary's	2023
Upper Eastern Shore	Cecil	2016
	Caroline	2021
	Kent	2018
	Queen Anne's	2015
	Talbot	2020
Lower Eastern Shore	Dorchester	2017
	Somerset	2021
	Wicomico	2014
	Worcester	2017

2 Single-Family Recycling Collection Programs

The following sections describe the current state of recycling programs in Maryland based on county, municipality, and facility survey data for single-family customers. Only single family households are discussed in this technical memorandum, as multi-family residential data is presented in **Appendix F: Multi-Family and Commercial Recycling Services**.

2.1 Single-family Recycling and Composting Access

County and municipal survey results indicate that 20 out of 24 Maryland counties, including Baltimore City, have access to curbside recycling services for single-family customers, as shown in **Table 2.** This includes single-stream, dual-stream, and/or multi-stream services. All counties in the State provide access to at least one (1) drop-off site for recycling services. Recycling access refers to recycling services being available by service providers in the respective county. These results do not indicate the number of households who subscribe to the service or set out their materials for collection, but it is an indication of where service (or the option for service) is currently offered. The population of a municipality is categorized as having access to recycling service if the response to the municipality survey indicates service is provided in their jurisdiction, if a review of the municipality or local service provider website showed residents could subscribe to the service, or if a recent study indicated that service was provided in that municipality.

Table 2: Availability of Single-Family Recycling and Composting Collection Services by Region[1]

Region	County	Curbside Recycling	Curbside Food Waste	Curbside Yard Waste	Drop-off Recycling	Drop-off Food Waste	Drop-off Yard Waste
Western Maryland	Allegany	X			X		X
	Garrett	X		X	X		
	Washington	X		X	X		
Washington Metro	Prince George's	X	X	X	X		X
	Frederick	X	X	X	X		X
	Montgomery	X	X	X	X		X
Baltimore Metro	Anne Arundel	X	X	X	X	X	X
	Baltimore	X	X	X	X		X
	Carroll	X		X	X		X
	City of Baltimore	X	X	X	X	X	X
	Harford	X			X		X
	Howard	X	X	X	X		X
Southern Maryland	Calvert	X			X		
	Charles	X		X	X		X
	St. Mary's				X		
Upper Eastern Shore	Cecil	X			X		X
	Caroline				X		
	Kent	X			X		
	Queen Anne's	X			X		

Region	County	Curbside Recycling	Curbside Food Waste	Curbside Yard Waste	Drop-off Recycling	Drop-off Food Waste	Drop-off Yard Waste
	Talbot	X			X		
Lower Eastern Shore	Dorchester				X		
	Somerset				X		
	Wicomico	X			X		
	Worcester	X			X		X

[1] The services indicated above are not necessarily provided county-wide, just meant to identify if these services exist in the County.

The Washington Metro Region reported having curbside access to recycling, food waste, and yard waste curbside collection. Food waste collection is reported to be available in the Washington Metro and Baltimore Metro Regions. The Upper and Lower Eastern Shore Regions have the least amount of service options for single-family customers compared to other Regions in the State with four (4) of the seven (7) counties not having access to curbside recycling.

2.1.1 Generators

Table 3 presents the number of single-family dwelling units by County. The State's housing distribution shows significant regional variation and provides an estimate for the number of single-family customers that currently receive service or may receive service under a future EPR program.

Table 3: Single-Family Dwelling Units by County

Region/County	Total housing units	One-unit, detached	One-unit, attached
Western Maryland	115,100	77,600	13,200
Garrett	18,500	14,700	1,100
Allegany	32,900	23,500	2,100
Washington	63,700	39,400	10,000
Washington Metro	867,000	435,000	152,100
Frederick	104,200	63,300	22,400
Montgomery	403,600	189,400	71,900
Prince George's	359,200	182,300	57,800
Baltimore Metro	1,169,100	524,900	334,000
Harford	103,600	62,800	21,200
Baltimore	349,500	165,800	81,000

Region/County	Total housing units	One-unit, detached	One-unit, attached
Carroll	65,800	50,800	7,100
Howard	123,400	63,100	27,100
City of Baltimore	293,600	43,000	148,600
Anne Arundel	233,200	139,400	49,000
Southern Maryland	143,800	108,500	18,600
Charles	62,400	44,300	12,100
Calvert	35,700	31,000	2,400
St. Mary's	45,700	33,200	4,100
Upper Eastern Shore	108,800	82,900	7,200
Talbot	19,600	15,300	1,300
Caroline	13,500	10,400	400
Queen Anne's	21,400	17,800	1,100
Kent	10,300	8,200	400
Cecil	44,000	31,200	4,000
Lower Eastern Shore	127,400	74,100	9,100
Dorchester	16,400	12,200	800
Wicomico	43,700	30,300	2,600
Somerset	10,900	7,300	300
Worcester	56,400	24,300	5,400
Total	**2,531,200**	**1,303,000**	**534,200**

Source: Census 2022 ACS 5 YR (most recent 5 YR ACS available that incorporate places with populations over 65,000)

Detached homes are more prevalent in rural and suburban areas, particularly in Regions like Southern Maryland and Upper Eastern Shore. Attached one-unit or houses on smaller properties smaller parcels are prevalent in urban areas. The Baltimore Metro Region has the most housing units overall (1,168,973) followed by the Washington Metro Region driven by Montgomery and Prince George's counties.

The curbside collection programs required to collect from the suburban or rural areas of the State (e.g., curbside) vary from those that service urban areas (e.g., alleyway). The collection methods vary due to housing density, width of roadways, materials generated, and other factors in these areas. **Table 4** shows the density of single-family housing units per square mile by Region in Maryland.

Table 4: Density (per mi^2) of Single-Family Housing per County

Region/County	Density of Single-Family Housing (per mi^2)
Western Maryland	**66.96**
Garrett	25.32
Allegany	69.21
Washington	123.76
Washington Metro	**401.47**
Frederick	139.57
Montgomery	587.47
Prince George's	570.41
Baltimore Metro	**435.57**
Harford	205.21
Baltimore	471.67
Carroll	137.06
Howard	396.74
City of Baltimore	2,949.56
Anne Arundel	481.28
Southern Maryland	**127.72**
Charles	126.61
Calvert	158.73
St. Mary's	110.64
Upper Eastern Shore	**62.75**
Talbot	69.19
Caroline	38.18
Queen Anne's	54.04
Kent	34.45
Cecil	112.41
Lower Eastern Shore	**55.56**
Dorchester	26.73

Region/County	Density of Single-Family Housing (per mi^2)
Wicomico	97.17
Somerset	27.56
Worcester	74.71

City of Baltimore has the highest density of single-family housing at 2,950 housing units per square mile.

Montgomery County and Prince George's Counties are the next most densely populated areas with 587 and 570 housing units per square mile, respectively. These housing densities reflect the suburban nature of these areas with single family dense clusters.

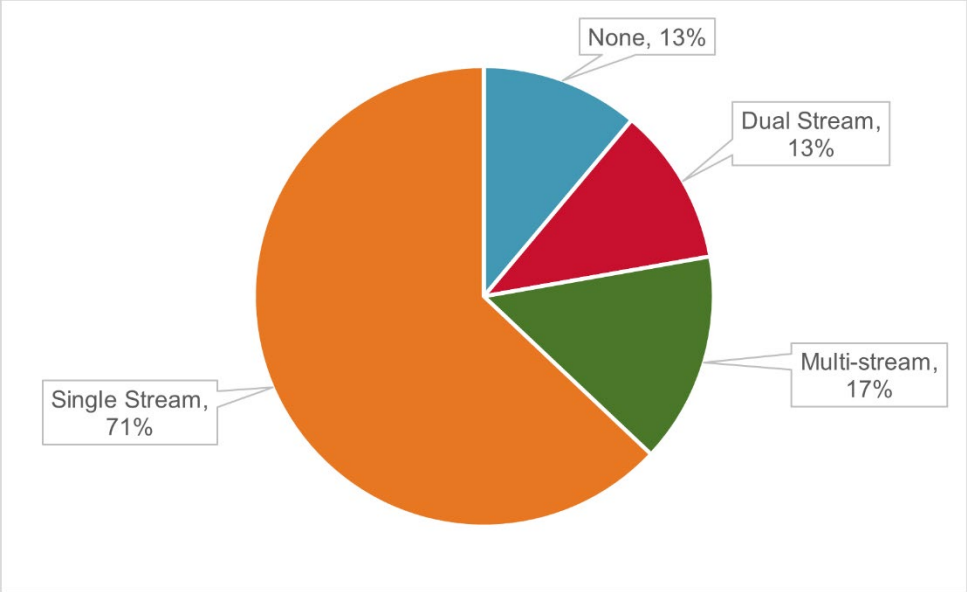
Garrett County has the lowest housing density at 25 units per square mile. As a rural area in the Western Maryland Region, Garrett County is characterized by more undeveloped land with fewer single-family homes. Caroline County is in the Upper Eastern Shore and has a low housing density of 38 units per square mile with the same characteristics. These lower housing densities are typical for counties on the Eastern Shore, where agricultural practices and undeveloped land are abundant.

Suburban areas such as Frederick, Harford, and Anne Arundel Counties have medium to high housing densities, balancing suburban and semi-urban housing styles with ample land space for larger homes and developments.

2.1.2 Curbside Collection Programs

The majority of single-family residential curbside services are collected for single stream processing. **Figure 1** presents the percentage of counties that have single stream, dual stream, multi-stream, or no curbside recycling collection services in the State**.**

Figure 1: Percentages of Single-Family Recycling Collection Programs in Maryland



County survey data shows that most counties with recycling services have haulers providing open market services in their jurisdiction (**Table 5**). Open market services provide the opportunity for individual homeowners to select a hauler in their area provide service to their home. Many counties in the Washington Metro and Baltimore Metro Regions manage single-family recycling contracts at the county level. Municipalities within counties may also manage their own collection services by either contracting for services or providing their own collection services with a municipally owned collection fleet. Six (6) counties reported having municipalities that provide their own single family recycling collection services, and seven (7) counties reported having municipalities that manage their own recycling collection contracts with private haulers. The services summarized in Table 5 were derived from information provided by various entities, and include municipal hauling, county contracts, municipal contracts, or open market services. The information provided shows that weekly collection is the most common frequency when services are available.

Table 5: Single-Family Curbside Recycling Collection Services

Region	County	Service Providers	Type(s) of Collection	Container Types	Collection Frequency
Western Maryland	Allegany	Municipal Contract(s) and Open Market	Single Stream / Dual Stream	Carts	N/A
	Garrett	Open Market	N/A	N/A	N/A
	Washington	Municipal Contract(s) and Open Market	Single Stream	Bags, Carts	Varies based on Contract

Region	County	Service Providers	Type(s) of Collection	Container Types	Collection Frequency
Washington Metro	Prince George's	County Contract(s), Municipal Contract(s), and Open Market	Single Stream	Carts	Weekly
	Frederick	County Contract(s)	Single Stream	Bags, Carts	Every other Week
	Montgomery	County Contract(s) and Open Market	Single Stream / Dual Stream	Bags, Carts, Bins	Weekly
Baltimore Metro	Anne Arundel	County Contract(s) and Open Market	Single Stream	Bags, Carts, Bins	Weekly
	Baltimore	County Contract(s)	Single Stream	Carts, Bins	Weekly
	Carroll	Municipal Contract(s) and Open Market	Single Stream	Carts, Bins	N/A
	City of Baltimore	Municipal Contract(s) and Municipal Collection	Single Stream	Bags, Carts, Dumpsters, Roll-off containers	Weekly
	Harford	Municipal Collection and Open market	Single Stream	Carts	Weekly
	Howard	County Contract(s)	Single Stream	Bags, Carts	Weekly
Southern Maryland	Calvert	Open Market	Dual Stream	Carts	No Information Found
	Charles	County Contract(s), Municipal Contract(s), Municipal Collection, and Open Market	Single Stream	Carts	Every other Week
	St. Mary's	None	N/A	N/A	N/A
Upper Eastern Shore	Cecil	Municipal Contract(s) and Open Market	Single Stream	Carts	Weekly
	Caroline	Open Market	Single Stream / Multi-Stream	Carts	Weekly
	Kent	Open Market	Single Stream	N/A	N/A
	Queen Anne's	County Contract(s) and Open Market	Single Stream	N/A	N/A
	Talbot	Open Market	Single Stream / Multi-stream	N/A	N/A
Lower Eastern Shore	Dorchester	None	N/A	N/A	N/A
	Somerset	None	N/A	N/A	N/A

Region	County	Service Providers	Type(s) of Collection	Container Types	Collection Frequency
	Wicomico	Municipal Contract(s), Municipal Collection, and Open Market	Multi-Stream	N/A	N/A
	Worcester	Municipal Collection and Open Market	Multi-Stream	Bags, Carts	Weekly

N/A indicates that the information was not received by the County or could not be verified

Curbside recycling participation rates reported by Counties as part of the survey are presented in **Table 6.**

Table 6: Single-Family Curbside Recycling Participation Rates by Region

Region	County	Single Family Participation
Western Maryland	Allegany	25-50%
	Garrett	25-50%
	Washington	Less than 25%
Washington Metro	Prince George's	50-75%
	Frederick	>90%
	Montgomery	100%
Baltimore Metro	Anne Arundel	>90%
	Baltimore	100%
	Carroll	25-50%
	City of Baltimore	75-90%
	Harford	>90%
	Howard	75-90%
Southern Maryland	Calvert	50-75%
	Charles	75-90%
	St. Mary's	N/A
Upper Eastern Shore	Cecil	N/A
	Caroline	25-50%
	Kent	25-50%
	Queen Anne's	N/A
	Talbot	25-50%
Lower Eastern Shore	Dorchester	N/A
	Somerset	N/A
	Wicomico	N/A
	Worcester	25-50%

Region	County	Single Family Participation

N/A indicates that the information was not received by the County or could by be verified

Participation rates reflect the number of single family households that have either independently entered a curbside recycling contract with a recycling hauler or been provided with a hauler contract by their county or municipality. Participation rates reported by the County as part the survey seem to align with the types of services offered (See **Table 2** describing the availability of single-family recycling and composting collection by Region). In those areas where more recycling services are available, as in the Washington Metro and Baltimore Metro Regions, single-family homes have higher participation rates. Single-family homes have the lowest participation rates in recycling programs in the Upper and Lower Eastern Shore and Western Maryland Regions.

2.1.3 Drop-off Sites

Table 7 summarizes the number of drop-off sites within each County and Region. Based on surveys and research, regions with fewer curbside services are generally reported to have more drop-off recycling options available for residents.

Table 7: Drop-off Sites by Region

Region	County	Number of Drop-off Sites
Western Maryland	Allegany	6
	Garrett	7
	Washington	5
Washington Metro	Prince George's	2
	Frederick	1
	Montgomery	2
Baltimore Metro	Anne Arundel	3
	Baltimore	3
	Carroll	2
	City of Baltimore	5
	Harford	1
	Howard	1
Southern Maryland	Calvert	6
	Charles	4
	St. Mary's	6
Upper Eastern Shore	Cecil	3
	Caroline	12
	Kent	6
	Queen Anne's	12

Region	County	Number of Drop-off Sites
	Talbot	5
Lower Eastern Shore	Dorchester	5
	Somerset	5
	Wicomico	15
	Worcester	9

The Upper and Lower Eastern Shore Regions are geographically isolated and have established unique solid waste management practices. Maryland Environmental Services (MES) operates a network of 35 drop-off sites throughout Caroline, Kent, Queen Anne's, and Talbot Counties known as the Mid-Shore Regional Recycling Program (MRRP). The estimated annual cost of the MRRP is $800,000 per year which includes the management of the drop-off station sites, servicing the collection containers, delivering and managing collected material, and transportation to end markets.

2.1.4 Customer Costs

Based on survey results and information reviewed in the County SWMPs, single-family recycling fees are charged at the county level through property taxes, at the municipal level through utility billing or town taxes, through tipping fees at county or municipal facilities, or via subscription in an open market system when an individual household signs up for service. Some counties include a "System Benefit Charge" (SBC) within their property tax bill to charge residents for capital and operating costs for solid waste disposal and recycling services. For example, in Frederick County, residents are charged approximately $7-$8/month for recycling services via the SBC on their property tax bill. In Montgomery County, residents are also charged $7-8/month for trash and recycling services. SBCs are still heavily subsidized for residents and likely do not reflect the true cost of recycling services for the County. Some counties also leverage the SBC for recycling drop-off operations or supporting commercial recycling efforts.

Municipalities who charge services via utility bill are offering trash, recycling, and other programs for a combined total between $20-40/month. Sometimes recycling services are offered for an additional, separate charge.

Drop-off sites across Maryland are primarily free for residents and funded mainly through county or municipality budgets. The MRRP specifically leverages a surcharge on landfill tip fees, in addition to grants, loans, recycling revenues, and county funds to fund free drop-off operations in Caroline, Kent, Queen Anne's and Talbot Counties.

2.1.5 Accepted Materials

County and municipal surveys indicated that most programs accept plastic bottles and containers, paper materials, and glass typical for recycling systems. Some of the

programs accept additional types of containers, such as cartons and poly-coated paper such as paper cups.

Most counties and municipalities reported accepting the following materials:

- Plastic Containers:
  - #1 Polyethylene terephthalate (PET)Bottles
  - #2 High -Density Polyethylene (HDPE)Bottles
  - #5 Polypropylene (PP) Rigid Containers
- Cardboard and Paper:
  - Old Corrugated Cardboard (OCC)
  - Mixed Paper (office paper, newspaper)
  - Chipboard/boxboard
  - Magazines
- Glass Bottles and Jars
- Metals
  - Used Beverage Cans (UBC)
  - Steel cans

A few counties and municipalities accept the following materials:

- PET Thermoforms
- Coffee Cups
- Cartons

Counties and municipalities did not report processing the following:

- Film Plastic
- Nursery Containers

2.1.6 Active Recycling Service

Active recycling service refers to a household with access to recycling services by either automatically being provided recycling, being required to subscribe to recycling, or voluntarily subscribing to a recycling service. Households with access to a recycling service contract who opt out of subscribing are excluded from this group. These results indicate the number of households who have been provided with recycling or have subscribed to a recycling service, but they do not indicate whether they use the service to recycle their materials.

Survey data provided by the counties and municipalities suggests that approximately 1.6 million, or nearly 90% of single-family households have active curbside recycling services, as shown in **Table 8**.

Table 8: Number of Single-Family Households Active Curbside Recycling Service by Type and Region

Region	County Provided	Municipality Provided	Open Market Provided	Total Active	No Service	Total
Western Maryland	0	23,800	24,500	**48,300**	42,300	90,600
Washington Metro	469,500	110,500	3,100	**583,100**	5,300	588,400
Baltimore Metro	705,700	24,100	98,600	**828,400**	39,000	867,400
Southern Maryland	51,200	7,900	18,300	**77,400**	49,700	127,100
Upper Eastern Shore	0	6,800	72,900	**79,700**	10,400	90,100
Lower Eastern Shore	0	15,100	8,300	**23,500**	59,600	83,100
Statewide Households	**1,226,400**	**188,200**	**225,700**	**1,640,300**	**206,400**	**1,846,700**
Percent of Single-Family Households	**66%**	**10%**	**12%**	**89%**	**11%**	**100%**

The Washington Metro and Baltimore Metro Regions have nearly 100% active curbside recycling service for single family homes, primarily provided by the counties. The second highest active service exists in the Upper Eastern Shore, largely in the form of open market service. The least amount of active service exists in the Lower Eastern Shore, with approximately 72% of the Region without active service. **Table 9** summarizes the percent of active service by region for single family households.

Table 9: Percentage of Single-Family Active Curbside Recycling Service by Type and Region

Region	County Provided	Municipality Provided	Open Market Provided	Total Active	No Service	Total
Western Maryland	0%	26%	27%	**53%**	47%	**100%**
Washington Metro	80%	19%	1%	**99%**	1%	**100%**
Baltimore Metro	81%	3%	11%	**96%**	4%	**100%**
Southern Maryland	40%	6%	14%	**61%**	39%	**100%**
Upper Eastern Shore	0%	8%	81%	**88%**	12%	**100%**
Lower Eastern Shore	0%	18%	10%	**28%**	72%	**100%**
Statewide	**66%**	**10%**	**12%**	**89%**	**11%**	**100%**

The findings in the table above present active curbside recycling service at the regional level, leveraging survey results based on the approach described in **Section 1.2.1.** The Project Team reviewed prior national studies conducted on curbside recycling access at the state level to identify any discrepancies between the overall results.

2021 American Forestry and Paper Association (AFPA) Access to Recycling Study measured curbside and drop-off community recycling programs with a focus on

paper products and packaging.[3] The findings reinforce that paper is an important material to include in future policy, as paper products (not only packaging materials) make up a significant portion of the recycling system. The study concludes that community recycling programs for paper and paper-based packaging are well-developed and widely accessible, but do not present results on a regional basis for the state of Maryland.

The Recycling Partnership (TRP) also conducted a nationwide study on recycling access, the 2024 State of Recycling Report[4], which provides recycling access data for single family and multi-family households specifically in Maryland, as shown in **Table 10.**

Table 10: 2024 State of Recycling Report Maryland Results (Conducted by TRP)

	Single-Family			Multi-Family	Total Households	
State	Total	Curbside	Drop-off	Can Recycle (Access)	Can Recycle (Access)	Cannot Recycle
Maryland	98%	87%	11%	88%	96%	4%

The TRP report presents data on a more granular level, including single-family and multi-family households. The report concludes that households in Maryland have high levels of access to recycling services, utilizing the following assumptions:

- Access for single family is defined as:
  - Households where curbside collection is automatically provided
  - 30% of household where subscription curbside collection is offered
  - Households with no curbside option in city/county that offers drop-off (not store-drop off but a location that accepts multiple recyclables)
- Access for multi-family (households with on-property access) is defined as:
  - 90% of households have on-property access where there is mandatory multifamily recycling ordinance
  - 30% of households have on-property access where the jurisdiction offers education/technical support to multifamily households or property managers
  - 6% of household have on-property access everywhere else

[3] American Forestry and Paper Association (AFPA). Access to Recycling Study: Tracking Consumer Access to Community Paper Recycling. https://www.afandpa.org/statistics-resources/2021-afpa-access-recycling-study

[4] The Recycling Partnership. State of Recycling: The Present and Future of Residential Recycling in the U.S., 2024. 2024 State of Recycling Report - The Recycling Partnership

Comparatively, the results of the Needs Assessment results are consistent with AFPA and TRP, and build on these efforts to present the varying levels of access and service types among the State's populations.

2.2 Recycling Rate

The MRA recycling rate helps MDE understand if Maryland has met the Statewide recycling rate goal of 55%.[5] For this analysis, the Project Team is considering the recycling rate, rather than the diversion rate, which takes into account source reduction credits. Note, the MRA recycling rates are not specific to single-family households. **Table 11** displays the MRA recycling rate by County.

Table 11: MRA Recycling Rate by County (2022)

Region	County	MRA Recyclables (tons)	Total MRA (tons)	MRA Recycling Rate (%)
Western Maryland	Allegany County	55,000	117,100	47%
	Garrett County	169,100	349,900	41%
	Washington County	2,300	37,800	30%
Washington Metro	Prince George's County	156,500	240,100	46%
	Frederick County	96,000	551,900	46%
	Montgomery County	14,200	60,900	40%
Baltimore Metro	Anne Arundel County	15,200	36,600	42%
	Baltimore County	571,700	1,235,900	24%
	Carroll County	365,300	918,800	25%
	City of Baltimore	54,500	180,100	17%
	Harford County	218,100	488,500	48%
	Howard County	33,200	93,400	45%
Southern Maryland	Calvert County	140,100	305,000	36%
	Charles County	274,200	1,120,400	46%
	St. Mary's County	19,100	58,100	23%
Upper Eastern Shore	Cecil County	261,800	624,700	65%
	Mid-Shore[1]	64,500	141,200	51%
Lower Eastern Shore	Dorchester County	50,800	205,500	33%
	Somerset County	114,200	225,600	6%
	Wicomico County	153,000	286,700	53%
	Worcester County	36,800	96,100	38%
	Maryland Totals	**2,865,600**	**7,374,300**	**39%**

[5] Maryland Department of Environment. "Frequently Asked Questions about Waste Diversion." Frequently Asked Questions

Region	County	MRA Recyclables (tons)	Total MRA (tons)	MRA Recycling Rate (%)

1. Mid-Shore represents Caroline County, Kent County, Queen Anne's County and Talbot County data on a combined basis.

Cecil County, in the Upper Eastern Shore region, has the highest reported recycling rate at 65%, while Somerset County, in the Lower Eastern Shore region, has the lowest at 6%.

2.2.1 Recycling Rate for Single-Family Packaging Materials

Over 50% of Maryland's recyclable materials generated are paper and cardboard. "Generation" refers to total materials generated in the state, whether or not they are ultimate disposed or recycled. Glass and rigid plastics are the next highest materials generated by weight. Cartons and metals (including steel and aluminum cans) have the lowest generation rate by weight. Tons of recyclables generated and recycled were calculated using the Statewide waste characterization, recycling tonnage data provided by MDE, and data obtained through MRF surveys. Single-family packaging tons generated are summarized by region in **Table 12.**

Table 12: Total PPP Single-Family Recycling Tons Generated (2022)

Region	Metal	Rigid Plastic	Flexible Plastic	Glass	Paper	OCC	Cartons	Total
Western Maryland	4,000	7,000	7,000	5,000	12,000	10,000	1,000	46,000
Washington Metro	15,000	42,000	32,000	50,000	92,000	61,000	3,000	295,000
Baltimore Metro	26,000	65,000	57,000	40,000	122,000	102,000	7,000	419,000
Southern Maryland	4,000	8,000	8,000	8,000	17,000	13,000	1,000	59,000
Upper Eastern Shore	3,000	7,000	6,000	5,000	12,000	10,000	1000	44,000
Lower Eastern Shore	2,000	5,000	6,000	4,000	10,000	8,000	1,000	36,000
Statewide	**54,000**	**134,000**	**116,000**	**112,000**	**265,000**	**204,000**	**14,000**	**898,000**
% of Generation	**6%**	**15%**	**13%**	**12%**	**30%**	**23%**	**2%**	**100%**

Single-family households in Western Maryland, Upper Eastern Shore, and Washington Metro Regions generate the highest weight of recyclable materials per dwelling unit; however, household generation is very similar across Regions with the exception of the Lower Eastern Shore Region generating slightly less weight per unit. Single-family weight of packaging materials recycled are summarized by region in **Table 13.**

Table 13: Tons of PPP Materials Recycled by Type for Single-Family Units (2022)

Region	Metal	Rigid Plastic	Flexible Plastic	Glass[1]	Paper	OCC	Cartons	Total
Western Maryland	1,000	1,600	0	1,300	500	1,400	0	5,800

Region	Metal	Rigid Plastic	Flexible Plastic	Glass[1]	Paper	OCC	Cartons	Total
Washington Metro	6,100	12,800	0	19,300	43,800	33,900	700	116,600
Baltimore Metro	7,200	23,700	0	14,100	34,000	45,900	500	125,400
Southern Maryland	700	1,400	0	0	4,500	3,900	100	10,600
Upper Eastern Shore	600	2,200	0	0	2,400	3,300	0	8,500
Lower Eastern Shore	300	500	0	0	500	1,500	0	2,800
Statewide	**15,900**	**42,200**	**0**	**34,700**	**85,700**	**89,900**	**1,300**	**269,700**
% of Recycling Stream	**6%**	**16%**	**0%**	**13%**	**32%**	**33%**	**0%**	**100%**

Based on the generation and recycling data provided above, **Table 14** summarizes the recycling rates by material type and Region.

Table 14: PPP Recycling Rate of Single-Family Recyclables by Material Type

Region	Metal	Rigid Plastic	Flexible Plastic	Glass	Paper	OCC	Cartons	Total
Western Maryland	25%	23%	0%	26%	4%	14%	0%	**13%**
Washington Metro	41%	30%	0%	39%	48%	56%	23%	**40%**
Baltimore Metro	28%	36%	0%	35%	28%	45%	7%	**30%**
Southern Maryland	18%	18%	0%	0%	26%	30%	10%	**18%**
Upper Eastern Shore	20%	31%	0%	0%	20%	33%	0%	**19%**
Lower Eastern Shore	15%	10%	0%	0%	5%	19%	0%	**8%**
Statewide	**29%**	**31%**	**0%**	**31%**	**32%**	**44%**	**9%**	**30%**

Washington Metro achieves the highest single-family recycling rate, particularly for glass (39%), paper (48%), and OCC (56%). In contrast, the Lower Eastern Shore has the lowest rates, including 15% for metal and 10% for rigid plastic.

2.3 Key Findings

- **Service providers and collection types vary regionally, with counties employing a mix of municipal contracts, county contracts, and open-market systems.** Western Maryland and the Lower Eastern Shore frequently rely on open-market contract arrangements, while Washington Metro and

Baltimore Metro regions more commonly use county and municipal contracts. Single-stream recycling is the dominant collection method across most regions, though dual-stream and multi-stream systems are also present in some counties, such as Calvert in Southern Maryland and Wicomico in the Lower Eastern Shore

- **Recycling drop-off infrastructure is strong across Maryland with each county having minimally one (1) drop-off site.** These sites are typically free of service charge, open to the public, and suggest that minimally, residents across the State have the opportunity to recycle.
- **Approximately 1.6 million, or nearly 90% of single-family households have active curbside recycling services** according to survey responses from counties and municipalities. The Washington Metro and Baltimore Metro Regions have nearly 100% active curbside recycling service for households, primarily provided by the counties. The second highest active service exists in the Upper Eastern Shore due to the large amount of open market service options and widely available series of drop-off stations. The least amount of active service exists in the Lower Eastern Shore, with approximately 72% of the Region without active service.
- **MRA recycling rates vary widely across the state ranging from as low as 6% to has high as 65%.** Cecil County in the Upper Eastern Shore reports the highest recycling rate with a 65% while Somerset County in the Lower Eastern Shore records the lowest at 6%. The Washington and Baltimore Metro Regions have the highest tonnages due to dense populations and established curbside collection programs. Western Maryland and the Lower Eastern Shore have the lowest tonnages and limited curbside infrastructure. Statewide, Maryland achieves a 39% MRA recycling rate.
- **Approximately 900,000 tons of packaging materials are generated in Maryland annually. Paper and OCC make up the majority of packaging materials generated, accounting for 30% and 23% by weight, respectively, while cartons and metals have the lowest generation quantities by weight.** Regions like the Baltimore Metro generate the highest tonnage of packaging materials (419,000 tons), driven by urban density followed by the Washington Metro (295,000 tons). The lowest quantities of packaging materials are generated in the Upper and Lower Eastern Shore and Western Maryland Regions.
- **Recycling capture rates are higher in the more populated areas of the State.** The Washington Metro region leads in single-family recycling capture rates, particularly for glass (74%), paper (48%), and OCC (56%), reflecting strong collection and processing systems. Conversely, the Lower Eastern Shore has low capture rates for metals (12%) and rigid plastics (11%).

3 Recycling Processing Facilities

The following sections describe the known MRFs, transfer stations, and composting facilities in Maryland. MRFs and Composting facilities were surveyed for this Recycling Needs Assessment. Transfer stations were not surveyed; however, the transfer infrastructure is essential when considering expanding recycling services in Maryland.

3.1 Material Recovery Facilities (MRFs)

There are 16 MRFs that accept recyclables generated from Maryland, including out of state facilities, as shown in **Table 15**. This includes eight (8) single stream MRFs, which sort commingled recyclables, and one (1) dual-stream MRF which receives source-separated containers and paper. Three (3) "push and bale" facilities are included in the table below as they bale certain source separated commodities on site while shipping the rest of the commingled recyclables for sortation to another facility. One (1) facility is considered "multi-stream" because source separated commodities are shipped to end market from that location. Three (3) facilities have paper-only operations.

Table 15: Recycling Processing Facilities Managing Material Generated in Maryland

Region	County	Facility Name	Owner/Operator	Facility Type
Western Maryland	Washington	Hagerstown Facility	Republic Services	OCC Push/Bale
	Washington	Apple Valley Waste	Apple Valley	Single Stream
Washington Metro	Montgomery	Montgomery County Recycling Center	Montogomery County / MES	Dual stream
	Prince George's	Prince George's County MRF	Prince George's County / MES	Single stream
		Encore Recycling	Encore Recycling	Paper Only
		WB Waste	WB Waste	Single Stream
Baltimore Metro	Baltimore	Baltimore County MRF	Baltimore County / MES	Single Stream
	Howard	WM Elkridge Recycling Facility	WM	Single Stream
	City of Baltimore	WMRA Baltimore MRF	WM	Push/Bale
		World Recycling	World Recycling Company	Paper Only

Region	County	Facility Name	Owner/Operator	Facility Type
Upper Eastern Shore	Talbot	Midshore Regional Landfill – Transfer Station[6]	MES	Multi-Stream, Push/Bale
Lower Eastern Shore	Wicomico	Eagle Recycling	Eagle Recycling LLC	Paper Only, Limited Single Stream
		Wicomico County MRF	Wicomico County	Multi-Stream
Out of State	New Castle, DE	Delaware Solid Waste Authority MRF	Republic Services	Single Stream
	Prince William, VA	Northern Virginia MRF	Republic Services	Single Stream
	York, PA	Penn Waste MRF	Penn Waste Inc.	Single Stream

The Upper and Lower Eastern Shore Regions are geographically isolated from the rest of Maryland; therefore, their materials are sent to different facilities compared to the rest of the state. Single stream materials collected in the Upper and Lower Eastern Shore Regions are sent to Republic's Delaware MRF. Multi-stream materials collected in the Lower Easter Shore are sent to Wicomico's MRF or Eagle Recycling (paper only). Many more recycling facilities are located on the western side of Maryland due to the larger population and increased services, as displayed in **Table 16.**

Table 16 summarizes MRF or transfer station tipping fees for recyclables provided by the County survey. Tipping fees range from less than $25 to over $100 per ton throughout the state.

Table 16: Recycling Tipping Fees by Region

Region	County	MRF/Transfer Station Tipping Fees per Ton
Western Maryland	Allegany	$50-$75
	Garrett	N/A
	Washington	N/A
Washington Metro	Prince George's	$75-$100
	Frederick	$25-$50
	Montgomery	<$25
Baltimore Metro	Anne Arundel	$75-$100
	Baltimore	<$25

[6] This facility is also listed on as a transfer station in **Table 17** as materials are both transferred and shipped to end markets from this facility.

Region	County	MRF/Transfer Station Tipping Fees per Ton
	Carroll	>$100
	City of Baltimore	$50-$75
	Harford	<$25
	Howard	>$100
Southern Maryland	Calvert	$75-$100
	Charles	$75-$100
	St. Mary's	>$100
Upper Eastern Shore	Cecil	>$100
	Caroline	$50-$75
	Kent	N/A
	Queen Anne's	N/A
	Talbot	$50-$75
Lower Eastern Shore	Dorchester	N/A
	Somerset	N/A
	Wicomico	N/A
	Worcester	$75-100

Counties within the Washington Metro and Baltimore Metro Regions include counties with the lowest recycling tipping fees compared to other Regions. Regions that have less access to recycling services (**Table 2**) exhibit either more expensive tipping fees or the fees are unknown.

3.2 Transfer Stations

Table 17 provides a list of recycling transfer stations managing MSW and/or recycling in the State. Note, there may be some overlap between the transfer station and drop-off site facilities because drop-offs sites transfer materials.

Table 17: Recycling Transfer Stations by Region

Region	County	Transfer Station	Accepts Recyclables
Western Maryland	Allegany	Penn-Mar Recycling	Yes
		Mountainview Landfill	Yes
		Western Maryland Waste Systems	No
		WM - Western Maryland Hauling and Transfer Station	No
Washington Metro	Prince George's	Recycle One Processing Facility & Transfer Station	No
		Sheriff Rd Processing & Transfer Station	No

Region	County	Transfer Station	Accepts Recyclables
	Frederick	Site B Solid Waste Processing Facility and Transfer Station (Reichs Ford Municipal Landfill and Transfer Station)	Yes
	Montgomery	Montgomery County Shady Grove Transfer Station	No
		Tri-County Recyclable Depot Processing Facility &Transfer Sstation (PF&TS)	No
Baltimore Metro	Anne Arundel	Millersville Municipal Landfill	Yes
		Curtis Creek Processing Facility and Transfer Station	No
		Annapolis Junction Processing Facility and Transfer Station	No
		Northern Processing and Transfer Station	No
	Baltimore	Central Acceptance Facility Processing Facility & Transfer Station	Yes
		Eastern MSW Landfill Transfer Station	Yes
		Western Acceptance Facility Transfer Station	Yes
	Carrol	Carroll County Municipal Landfill	No
		Finksburg Transfer Station	No
		Northern Municipal Landfill	Yes
	City of Baltimore	Northwest Transfer Station	Yes
		Baltimore Recycling Center Processing Facility & Transfer Station	No
		World Recycling Processing Facility &Transfer Station	No
	Harford	Auston Processing Facility & Transfer Station	No
	Howard	Alpha Ridge Processing Facility and Transfer Station	Yes
		Ameriwaste Processing Facility & Transfer Station	No
Southern Maryland	Calvert	Calvert County Transfer Station Garnet of Maryland, Inc. (dba Waste Management) (Appeal Landfill)	Yes
	Charles	Tri-County Recycling	Yes
		Charles County Landfill	Yes
	St. Mary's	N/A	N/A
Upper Eastern Shore	Cecil	Cecil County Landfill	Yes
		Stemmer's Run Transfer Station	Yes
		Woodlawn Transfer Station	Yes
	Talbot	Midshore Regional Solid Waste Facility	Yes

Region	County	Transfer Station	Accepts Recyclables
	Wicomico	Bennet Processing Facility	Yes
		Foskey Lane Transfer Station	No
		Connelly Mil Processing Facility and Transfer Station	No
	Worcester	Worcester County Central Landfill	Yes
		Ocean City Transfer Station	No

There are approximately forty-two (42) total transfer stations in Maryland and twenty-two (22) of those facilities transfer recyclables generated in the State. Recycling transfer stations are consolidated in the Baltimore Metro and Upper Eastern Shore Regions. Transfer stations for other materials are well distributed throughout the remainder of the state. Based on the hauler survey there are several transfer stations that accept MSW and recyclables in Washington DC (Northeast Transfer Station and Fort Totten Transfer Station) and Delaware (Farmington Transfer Station and Milford Transfer Station).

3.3 Organics Processing Facilities

There are 25 permitted organics recycling facilities in Maryland, including both currently operating and planned composting and anaerobic digestion (AD) facilities, as shown in **Table 18**. Facilities are permitted into two tiers:

- **Tier I Compost Facility:** Facility that accepts Type I feedstock, i.e., yard waste. Yard waste is organic plant waste derived from gardening, landscaping, and tree trimming activities and includes leaves, garden waste, and lawn cuttings.
- **Tier II Compost Facility:** Facility that accepts Type II feedstock, i.e., a) source-separated organics; b) department-approved animal manure and bedding; c) department-approved industrially produced food processing materials, including industrial poultry and seafood residuals; d) animal mortalities; e) manufactured organic materials such as waxed-corrugated cardboard, non-coated paper, and compostable products; and f) other department-approved materials.

Tier II facilities are most relevant to this Needs Assessment due to their ability, in some cases, to accept and process compostable packaging products; however not all Tier II facilities accept compostable packaging.

Table 18: Organics Recycling Facilities by County and Facility Type

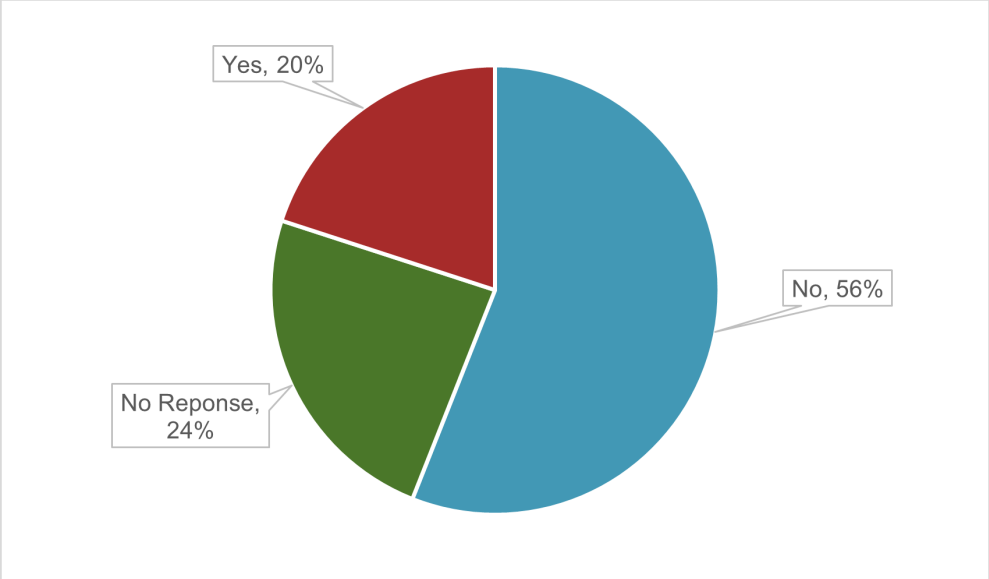
Region	County	Facility Name	Facility Type	Accept Compostable Packaging
Western Maryland	Washington	40 West Landfill	Tier I - Yard Trimmings	No

Region	County	Facility Name	Facility Type	Accept Compostable Packaging
Washington Metro	Frederick	Frederick County Department of Solid Waste Management	Tier I - Yard Trimmings	No
		Key City Compost at Utica Bridge Farm	Tier II Small - Yard Trimmings, Food Scraps, Manure etc.	Unknown
	Montgomery	Montgomery County Yard Trim Composting Facility	Tier I - Yard Trimmings	No
		ACME Biomass Reduction, Inc.	Tier I - Yard Trimmings	Unknown
		Aspen Nursery	Tier I - Yard Trimmings	No
		Compost Crew at Wasche Farm	Tier II Small - Yard Trimmings, Food Scraps, Manure etc.	Unknown
	Prince George's	Prince George's County Organics Composting Facility	Tier II Large - Food Scraps, Yard Trimmings	Yes
		City of College Park	Tier I - Yard Trimmings	No
Baltimore Metro	Harford	Harford Waste Disposal Center Mulch Compost Facility	Tier I - Yard Trimmings, NWW	Yes
		Veteran Compost - Aberdeen	Tier II Small - Food Scraps, Manure, Wood Chips	Yes
	Baltimore	Eastern Sanitary Landfill Solid Waste Management Facility	Tier I - Yard Trimmings	No
	Carroll	WeCare Denali Composting Facility	Tier I - Yard Trimmings	No
	Howard	Composting Facility at Alpha Ridge Landfill	Tier II Large - Food Scraps, Yard Trimmings, Manure	Unknown
		Level Land Lisbon Mulch Yard	Tier I - Yard Trimmings	No
		Bioenergy DEVCO - Maryland Organics Recycling Facility	Packaged food and post-consumer organics, Fats, oils and grease (“FOG”), Sludge from industrial food facilities like dairy and poultry processors, Litter (chickens, cows, pigs, humans, and any other litter)	Yes (depackager on site)
	City of Baltimore	Charm City Compost Facility	Tier II Large - Food Scraps, Manure, Yard waste	No, but planning to in the future.

Region	County	Facility Name	Facility Type	Accept Compostable Packaging
	Anne Arundel	Millersville Landfill and Resource Recovery Facility Composting Pad	Tier I - Yard Trimmings	No
		Tolson & Associates LLC	Tier I - Yard Trimmings	No
		Veteran Compost - Lothian	Tier II Small - Food Scraps, Manure, Wood Chips	Yes
Southern Maryland	Charles	Calvert Wood Recycling	Tier I - Yard Trimmings, NWW	No
Upper Eastern Shore	Caroline	Twin Maples Compost Facility	Tier II Large - Food Scraps, Manure	Unknown
	Cecil	Cecil County Central Landfill	Tier I - Yard Trimmings	No
		West Coast Mushrooms	Tier II Large - Hay, Straw, Manure	No
Lower Eastern Shore	Worcester	Ocean Compost	Tier II Small - Food Scraps, Yard Trimmings	Unknown

Eleven (11) out of the twenty-five (25) compost facilities are Tier II or anaerobic digesters that are able to process food waste, and therefore also capable of processing compostable packaging. This assumes that compostable packaging does not get screened out by a depackager. Additionally, separating compostable packaging from non-compostable packaging can be prohibitively expensive. Consumer misinformation can also be an issue for facilities, as there are misconceptions about the compostability of “biodegradable” products. Some packaging that is marketed as compostable does not break down in an adequate amount of time. Based on survey responses, there are at least five (5) compost facilities that currently accept compostable packaging, with at least one (1) additional that plans to or would be interested in accepting compostable packaging in the future. More facilities may currently accept compostable packaging than the ten (10) out of the twenty-five (25) total facilities that responded to the survey. **Figure 2** provides the percentage breakdown of compost facilities that accept compostable packaging (20%), showing that 24% of facilities did not provide a response to the survey.

Figure 2: Percent of Compost Facilities that Reported Accepting Compostable Packaging



Tier II and anaerobic digestion facilities are currently primarily located within the Baltimore Metro and Washington Metro Regions, correlating with the higher number of recycling and organics programs and higher population density.

3.4 Key Findings

- **Recyclables generated in the State are processed at a variety of facility types both in and out of the State.** There are sixteen (16) MRFs that accept recyclables generated in Maryland, including out of state facilities. This includes nine (9) single stream MRFs, which sort commingled recyclables, and one (1) dual-stream MRF which receives source-separated containers and paper. Three (3) "push and bale" facilities are located in the State that bale certain commodities on site while shipping the rest of the commingled recyclables for processing at another facility. Three (3) facilities have paper-only processing.
- **The Upper and Lower Eastern Shore Regions recyclables are delivered to MRFs and end markets in Delaware.** These areas of the State are geographically isolated and transporting recyclables to in-state processing can be cost prohibitive; therefore, their materials are sent to different facilities compared to the rest of the state. Single stream materials collected in the Upper and Lower Eastern Shore Regions are sent to Republic's Delaware MRF, and source separated materials managed by MES are sent directly to end markets.
- **Tipping fees at MRFs range from less than $25 to over $100 per ton throughout the State.** Counties within the Washington Metro and Baltimore Metro Regions present the lowest recycling tipping fees compared to other Regions. Regions that have less access to recycling services exhibit either more expensive tipping fees or the fees are unknown.

- **Processing recyclables at transfer stations in and out of the State presents an opportunity to provide logistical support to have recycling more efficiently reach key end markets.** There are approximately forty-two (42) total transfer stations in Maryland and twenty-two (22) of those facilities transfer recyclables generated in the State. Transfer stations that accept recyclables are consolidated in the Baltimore Metro and Upper Eastern Shore Regions.
- **Compost facilities in the Baltimore Metro and Washington Metro Regions are currently accepting and processing compostable packaging products.** Eleven (11) out of the twenty-five (25) compost facilities are permitted Tier II or anaerobic digesters, including currently operating and planned facilities, that are able to process food waste, and therefore capable of processing compostable packaging. This assumes that compostable packaging does not get screened out by a depackager. Additionally, separating compostable packaging from non-compostable packaging can be prohibitively expensive. Consumer misinformation can also be an issue for facilities, as there are misconceptions about the compostability of "biodegradable" products. Some packaging that is marketed as compostable does not break down in an adequate amount of time. Based on survey responses, there are at least five (5) compost facilities that currently accept compostable packaging, with at least one (1) that plans to or would be interested in accepting it in the future.
- **Tier II composting and anaerobic digestion facilities are currently mostly located within the Baltimore Metro and Washington Metro Regions.** The concentration of Tier II composting facilities correlates with the higher level of recycling and organics programs and higher population density areas of the State and presents the gap in available processing capacity for compostable packaging in the more rural or geographically unique areas.

4 Education, Outreach, and Compliance

This section evaluates the effectiveness of existing recycling education efforts in Maryland in fostering public understanding, encouraging active participation, and minimizing contamination at the State, county, and local levels. By analyzing current strategies, identifying apparent gaps, and recommending improvements, the following information aims to enhance Maryland's recycling consumer education initiatives through an EPR for packaging program, contributing to a more robust and sustainable Statewide recycling program.

Effective consumer education is a critical component of successful recycling programs. By providing clear and concise information, promoting best practices, and addressing common misconceptions, education efforts can:

- **Increase recycling participation rates:** Educate and empower individuals to make informed choices about waste disposal.

- **Reduce contamination rates:** Educate households and businesses about proper sorting and disposal methods.
- **Enhance the quality of recyclable materials:** Examine ways to reduce the amount of non-recyclable items.
- **Promote environmental stewardship:** Foster a sense of responsibility and commitment to sustainable practices.

By addressing these objectives and leveraging the insights gained from this assessment, MDE can improve the effectiveness of its recycling programs through a statewide EPR program for packaging and contribute to a more sustainable future.

4.1 Current Education Strategies

MDE plays a central role in overseeing recycling education initiatives across the State. The Source Reduction Credit Program (SRCP) is a cornerstone of these efforts, which incentivizes counties and municipalities to develop public education programs that encourage waste reduction. Tailored to meet the unique needs of local communities, Maryland's recycling education campaigns target diverse demographics and address Statewide waste management objectives.

The Project Team reviewed survey responses from counties and municipalities in addition to desktop research and review of the county SWMPs to evaluate the comprehensiveness and effectiveness of education programming throughout the state.

Several counties have tailored their recycling programs to address specific community needs, implementing innovative strategies to enhance public education and engagement. For example, Allegany County educates residents about source reduction purchasing principles, durable products, and composting through community events like fairs and "Too Toxic to Trash" collections. Anne Arundel County employs tools like the "Recycle Coach" smartphone app, direct mail campaigns, and school presentations to disseminate information. The City of Baltimore leverages digital platforms such as social media, newsletters, and outreach at festivals to promote proper recycling practices. Frederick County hosts public events, offers a Recycling Event Container Lending Program, and distributes educational literature.

School-based programs like Charles County's *iRecycle Smart* provide hands-on learning initiatives to teach students about proper recycling practices through paper-making labs, composter projects, and more. Anne Arundel County's "Recycle Coach" provides a sophisticated technological asset to increase consumer education. Additionally, targeted business outreach programs such as Montgomery County's Smart Organizations Reduce and Recycle Tons (SORRT) initiative provide practical ways for businesses to adopt better recycling services.

Many counties prioritize integrating recycling education into school curriculums. For instance, Harford County provides presentations for fourth-grade science classes

and supports recycling initiatives at school events. Howard County incorporates similar educational efforts to foster environmental stewardship among students.

Regarding business and commercial outreach, programs like Montgomery and Howard Counties' SORRT initiative help businesses adopt waste reduction practices through training sessions, technical guidance, and educational materials. Some counties have leveraged technology as an efficient solution to enhance engagement. Some jurisdictions use apps such as "Recycle Coach" or "Charles County Recycles," along with websites and social media platforms, to provide accessible information on recycling practices.

While some jurisdictions like Anne Arundel, Montgomery, and Howard Counties and the City of Baltimore offer unique consumer education and outreach strategies, there is a notable lack of targeted or incentive-based programs. Incentive-based Pay As You Throw (PAYT) programs can be found in Charles and Kent Counties. While some jurisdictions offered strong, trending technological solutions for education strategies in the form of smartphone applications, others didn't appear to provide curbside feedback programs, rural-specific targeted outreach, or recycling education focused on plastic film and other common contaminants. Despite these innovative approaches, disparities in perceived recycling education levels remain across Maryland jurisdictions, as shown in survey responses.

4.2 Recycling Education Levels

Survey respondents were asked to describe how well their jurisdiction's population is educated on recycling. **Figure 3** summarizes the findings, showing the majority of counties believe their residents are at least somewhat educated (46% of counties), or even well educated (38% of counties).

Figure 3: Perceived Recycling Education Levels by County

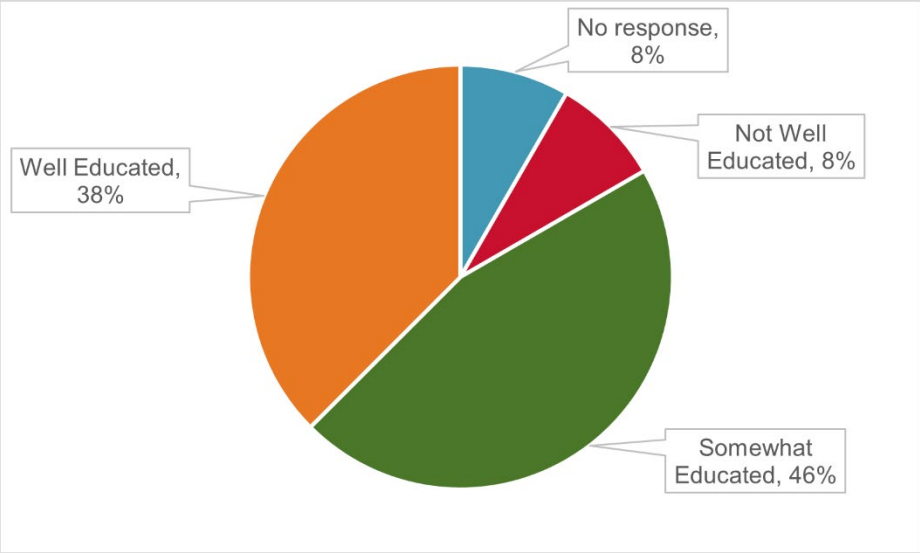


Table 19 summarizes county survey data by Region.

Table 19: County Reported Perceived Recycling Education Levels by Region

Region	Jurisdiction	Perceived Level of Recycling Education
Western Maryland	Allegany County	Not Well Educated
	Garrett County	Somewhat Educated
	Washington County	Somewhat Educated
Washington Metro	Prince George's County	Well Educated
	Frederick County	Well Educated
	Montgomery County	Well Educated
Baltimore Metro	Anne Arundel County	Well Educated
	Baltimore County	Well Educated
	Carroll County	Somewhat Educated
	City of Baltimore	Not Well Educated
	Harford County	Somewhat Educated
	Howard County	Somewhat Educated
Southern Maryland	Calvert County	Well Educated
	Charles County	Somewhat Educated
	St. Mary's County	Somewhat Educated
Upper Eastern Shore	Cecil County	Somewhat Educated
	Caroline County	Well Educated
	Kent County	Somewhat Educated
	Queen Anne's County	Somewhat Educated
	Talbot County	Well Educated
Lower Eastern Shore	Dorchester County	Somewhat Educated
	Somerset County	No response
	Wicomico County	No response
	Worcester County	Well Educated

The Washington Metro Region (Prince George's County, Montgomery County, Frederick County) reported higher levels of perceived recycling education ("Well Educated"). Studies on equitable recycling opportunities[7] have shown that populated

[7] CIRT. "Breaking Barriers: A Guide to More Equitable Recycling Opportunities." Last modified June 19, 2024. Accessed December 4, 2024. https://www.cirt.tech/blog-posts/breaking-barriers-a-guide-to-more-equitable-recycling-opportunities.

areas receive more targeted educational campaigns and have better access to recycling infrastructure

The Baltimore Metro Region presents a mixed picture regarding recycling education levels. Of the five respondents in this region, Anne Arundel County reported its population as being 'Well Educated.' In contrast, Harford County, Howard County, Carroll County, and the City of Baltimore were categorized as 'Somewhat Educated' or 'Not Well Educated.' This disparity highlights the uneven implementation of educational initiatives within the region. Urban centers like the City of Baltimore may face unique challenges, such as high contamination rates in recyclables and public skepticism about the effectiveness of recycling systems, which can hinder engagement and participation.[8]

These trends underscore the critical role of targeted educational programs in promoting recycling awareness. Research consistently highlights that well-designed educational initiatives can significantly influence recycling behaviors by addressing local needs and fostering environmental stewardship.[9] However, inequalities in perceived education levels will persist without equitable investment in infrastructure and outreach across regions.

While consumer education and outreach trends using digital platforms, business initiatives, and continued integration into school curricula are robust and needed changes in Maryland's recycling ecosystem, the lack of financial resources dedicated to recycling program education staff seems to limit the effectiveness of County-led recycling education programs. Despite the strong consumer education strategies offered by the City of Baltimore and Howard County, the jurisdictions' respondents nevertheless described their populations' recycling education levels as "Not Well Educated," and "Somewhat Educated," respectively. While digital tools like smartphone applications are valuable, jurisdictions with limited recycling program staff struggle to implement hyper-local and personalized outreach efforts, which require consistent staffing rather than solely technical solutions.

4.3 Language Accessibility

Survey results highlight the variety of recycling educational materials provided in multiple languages across Maryland jurisdictions. Most jurisdictions either do not offer multilingual resources or focus on a limited number of languages, primarily English and Spanish. Montgomery County stands out, providing education in a wide array of languages, including Chinese, Vietnamese, and Korean, among others. Similarly, the City of Salisbury offers recycling education in Spanish and Haitian Creole, reflecting efforts to address the needs of local immigrant populations. The

[8] CheckSammy. "The Current State of Recycling in the USA: A Comprehensive Analysis." Last modified October 2023. Accessed December 4, 2024. https://checksammy.com/blog/the-current-State-of-recycling-in-the-usa-a-comprehensive-analysis/.

[9] Green.org. "The Role of Education in Fostering a Recycling-Conscious Society." Last modified January 30, 2024. Accessed December 4, 2024. https://green.org/2024/01/30/the-role-of-education-in-fostering-a-recycling-conscious-society/.

languages for educational materials provided by each county are summarized by Region in **Table 20.**

Table 20: Languages Provided for Educational Materials by Region

Region	Languages
Western Maryland	English
Washington Metro	English, Spanish
Baltimore Metro	English, Spanish, Chinese, Vietnamese, Afro-Asiatic Languages, Korean, Japanese, Russian, French, Farsi, Amharic, and Portuguese
Southern Maryland	English
Upper Eastern Shore	English, Spanish
Lower Eastern Shore	English, Spanish

Language accessibility in recycling education is crucial for promoting equitable participation in environmental initiatives. Many Maryland jurisdictions include diverse populations whose primary language may not be English. Providing materials in multiple languages ensures broader community engagement, fosters inclusivity, and enhances compliance with recycling protocols. For instance, Montgomery County's extensive language options exemplify a commitment to inclusivity. Expanding such practices Statewide could significantly improve participation rates and the overall success of Maryland's recycling programs.

The impact of multilingual outreach extends beyond Maryland. Nationwide, efforts to engage multicultural communities have demonstrated the importance of culturally relevant and linguistically accessible recycling programs. For instance, Waste Management in Snohomish County, Washington, implemented targeted outreach to Spanish-speaking residents using direct mail campaigns and community-specific messaging. These efforts improved recycling behaviors and built trust within the Latino community.[10] Similarly, cities like Portland and Los Angeles have incorporated multilingual resources into broader zero-waste initiatives, recognizing that inclusivity is essential for achieving sustainability goals.[11] Expanding multilingual recycling education, Statewide could significantly improve participation rates and reduce contamination of recyclable materials. By adopting a diversity, equity, inclusion, and belonging (DEIB) framework, jurisdictions can ensure that residents—regardless of language or cultural background—can access reliable and culturally appropriate information about recycling practices.

[10] Resource Recycling. 2018. "Speaking Their Language," https://resource-recycling.com/recycling/2018/04/25/speaking-their-language/.

[11] The Recycling Partnership, "How Can We Create More Equitable Recycling Outreach?" https://recyclingpartnership.org/how-can-we-create-more-equitable-recycling-outreach/.

4.4 Current Staffing and Cost

Based on the survey responses, approximately 80% of the County survey respondents reported having full-time employees (FTE) dedicated to recycling education efforts and/or program management. The Baltimore Metro and Washington Metro Regions have the most staff, correlating with their robust programming efforts. In contrast, the Lower and Upper Eastern Shore Regions and Western Maryland Region do not have as much staff support to operate recycling programs, as Allegany, Kent, Queen Anne's, Somerset, and Wicomico Counties reported not having any dedicated recycling education and outreach staff (or the program manager also does education and outreach). **Table 21** further highlights these differences, showing that 10 counties reported 2+ FTEs. Notably, jurisdictions with two or more recycling program FTEs include Anne Arundel, Baltimore, Calvert, Caroline, Charles, Howard, Montgomery, Prince George's, Talbot, and Worcester Counties.

Table 21: Number of Counties with Recycling Education Program FTEs

Number of Education Staff	Number of Counties
0.5 – 1 FTE	7
1 -2 FTE	2
2+ FTE	10
N/A	5

4.5 Key Findings

- **There are opportunities to provide increased staffing among Counties in the State to direct additional effort towards education, outreach, and compliance programs statewide.** The Baltimore Metro and Washington Metro Regions have higher staffing, consistent with the larger population and programmatic needs; however, other Regions do not have enough staff to implement programs. For example, Counties are responsible for enforcing recycling for multi-family properties, as required by State statute[12]; however, this is typically not enforced, and property managers lack education on the matter due to a lack of resources. Increasing educational staff enhances the capacity of local governments to conduct personalized outreach and address unique community needs.
    - **Education activities are associated with higher recycling rates in Maryland counties.** A combination of diverse outreach activities correlated with higher recycling rates, potentially indicating that multifaceted approaches (printed materials, digital outreach, and public engagement) are more

[12] Maryland General Assembly. 2023. *Maryland Environment Code Section 9-1711: Apartment Buildings and Condominiums*. Retrieved from Justia website: Maryland Environment Code Section 9-1711 (2023) - Apartment Buildings and Condominiums :: 2023 Maryland Code :: US Codes and Statutes :: US Law :: Justia

effective. The survey data indicates a positive relationship between recycling participation and spending on recycling education. Directly mailed printed materials and in-person public outreach (events, school presentations) appear to be positively associated with higher recycling tonnage. Social media and website content alone may not be sufficient for high participation. While these platforms are valuable for raising awareness, they can be supplemented with more interactive and engaging methods, such as community events (e.g., recycling drives, workshops, or educational events), feedback mechanisms (e.g., surveys, etc.), targeted outreach, and partnerships with schools to use data to identify underperforming areas or demographics and tailor messaging or resources to their needs.

- **Access to services greatly impacts the efficacy and/or existence of education programs.** Areas without curbside collection services could face inherent challenges in boosting participation rates, regardless of educational efforts. This lack of infrastructure can overshadow the potential impact of education spending.
- **Education program best practices include:**
    - **Targeted public education campaigns to increase capture rates and reduce contamination.** Multimedia campaigns address common contaminants in recycling streams (e.g., plastic films, food waste) and can utilize clear visuals and messaging to educate consumers on what can and cannot be recycled.
    - **Multilingual recycling resources to encourage inclusivity and equitable access to recycling information and increase participation among diverse communities**. Providing recycling education materials in multiple languages across jurisdictions builds on efforts like Montgomery County's extensive multilingual outreach.
    - **Leveraging technology for recycling education and service information that is more equitable and engaging**. Phone applications are increasingly more popular and accessible for conveying information to residents and customers.
    - **Introducing curbside feedback programs to educate households on better sorting habits to reduce contamination.** Implementing programs where residents receive direct feedback on their recycling practices (e.g., tagging bins with contamination notices) helps to change behavior by intervening at the point of decision making.
    - **Strengthening School-Based Recycling Initiatives to instill lifelong recycling habits in younger generations.** Programs like Charles County's *iRecycle Smart* is applicable in other counties. This may include hands-on activities, classroom signage, and student-led collection efforts.
    - **Establishing regional recycling hubs to reduce contamination in curbside containers by diverting problematic materials to specialized**

facilities. Create centralized Drop-off locations for hard-to-recycle items like plastic films or Styrofoam with clear signage and staff assistance

- **Conducting pilot programs for innovative solutions.** Test new approaches such as innovative bin technology that automatically detects contamination or community-based repair/reuse workshops. Pilot programs can help identify scalable solutions to improve Maryland's recycling infrastructure further and reduce waste generation.

- **Many factors beyond educational spending, such as local policies, cultural attitudes, economic incentives, and logistical considerations, influence recycling participation.** While consumer education is essential, it must be part of a comprehensive strategy that addresses these other elements to enhance participation rates effectively.