Solid Waste Management And Recycling in Maryland

DEPARTMENT OF LEGISLATIVE SERVICES

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Department of Legislative Services
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DEPARTMENT OF LEGISLATIVE SERVICES
OFFICE OF POLICY ANALYSIS
MARYLAND GENERAL ASSEMBLY

Warren G. Deschenaux
Executive Director

January 9, 2017

The Honorable Thomas V. Mike Miller, Jr., President of the Senate
The Honorable Michael E. Busch, Speaker of the House of Delegates
Members of the Maryland General Assembly

Ladies and Gentlemen:

Maryland's per capita solid waste generation in 2014 was 1.1 tons, or 5.98 pounds per person per day, a level significantly higher than the U.S. Environmental Protection Agency's estimated 2013 national rate of 4.4 pounds per person per day. As the State's population continues to grow, averaging nearly 1% per year since 1999, the amount of waste generated will likely continue to increase. However, at current disposal rates, the remaining capacity of municipal landfills statewide is an estimated 31 years. Taken together, the continued growth in population and the limited capacity of the State's existing landfills will demand improvements in the way the State manages and recycles waste in the future.

The Natural Resources, Environment, and Transportation Workgroup developed this report to identify the existing solid waste management and recycling framework in Maryland; review recent initiatives, legislation, and regulations; and explore what other states are doing with their waste and recyclables. It concludes with a number of policy issues that the General Assembly may want to take into consideration.

We trust this report will prove useful to the General Assembly in gaining a better understanding of how solid waste and recyclables are currently managed in the State and steps the State may wish to take to improve waste management and recycling in the future. If you would like additional information regarding this report, please contact Ryane Necessary at (410) 946-5350.

Sincerely,

Warren G. Deschenaux
Executive Director

RMN/kjl

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Executive Summary

Maryland is a densely populated state facing a waste disposal predicament. In 2014, the State generated over 12 million tons of solid waste, an increase of 3.58% over the previous year. In light of the State's fairly steady population growth, averaging nearly 1.0% per year since 1999, the amount of waste generated will likely continue to increase. However, the remaining capacity of municipal landfills statewide is an estimated 31 years at current disposal rates. Moreover, restrictions on new permits for landfills limit options for increasing capacity. Despite efforts to reduce and divert solid waste, and the export of 2.3 million tons to out-of-state facilities, 1.4 million tons was incinerated and almost 2.3 million tons was landfilled in Maryland in 2014.

This report provides an overview of solid waste management and recycling, including composting, in Maryland. **Chapter 1** generally discusses the solid waste generated, collected, managed, and disposed of in the State. The State's solid waste infrastructure includes a number of private and county-owned facilities that are permitted by the Department of the Environment. However, local governments are primarily responsible for managing the collection, processing, recycling, and disposal of solid waste. **Chapter 2** addresses Maryland's recycling framework, and provides a general overview of the recycling process, discusses the Maryland Recycling Act, examines recycling at the local level, and provides an overview of non-Maryland Recycling Act recyclables and specialty State programs. Maryland recycles more per person than the U.S. average, but has room for improvement with regard to recycling certain materials including paper, yard trimmings, food scraps, and plastic. **Chapter 3** describes recent Maryland waste management and recycling initiatives, including Zero Waste, and recently introduced legislation. Legislation related to waste management and recycling is regularly introduced in the General Assembly. Most recently, the legislature has considered bills related to bottle deposit programs, plastic bags, and biological treatment of waste. In addition, local jurisdictions have developed their own initiatives to expand recycling within their jurisdictions. **Chapter 4** discusses waste management and recycling and innovative programs in other states. Neighboring states, including Virginia and Delaware, have implemented a variety of programs to increase waste diversion and recycling.

Finally, **Chapter 5** concludes the report with policy issues for consideration.

Chapter 1. An Overview of Solid Waste Management in Maryland

Solid Waste Generation in Maryland

Maryland's solid waste stream includes municipal solid waste, industrial waste, medical waste, rubble, scrap material, land-clearing debris, and sewage sludge. It is generated by residential, commercial, institutional, agricultural, and industrial sources.

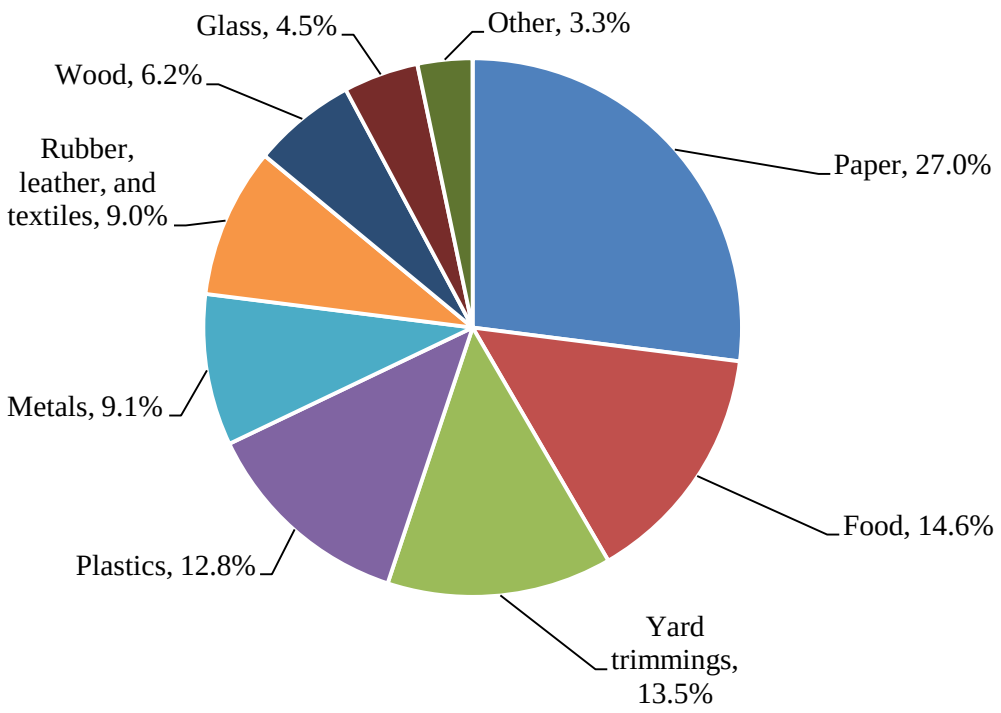
Municipal solid waste includes refuse collected from residential (homes), commercial (businesses), and institutional (schools and hospitals) sources. **Exhibit 1.1** shows the U.S. Environmental Protection Agency's (EPA) breakdown of total national municipal solid waste by material. By weight, national municipal solid waste is comprised of approximately 27.0% paper; 14.6% food scraps; 13.5% yard trimmings; 12.8% plastics; 9.1% metals; 9.0% rubber, leather, and textiles; 6.2% wood; 4.5% glass; and 3.3% other (*i.e.*, electrolytes in batteries, fluff pulp, feces, and urine in diapers). The Maryland Department of the Environment (MDE) uses EPA's analysis of national municipal solid waste as a proxy to characterize municipal solid waste in Maryland because detailed State information is not available.[1]

According to MDE, the best available data indicates that 12.1 million tons of solid waste was generated in Maryland in 2014, an increase of 3.58% over the previous year.[2] The State's per capita solid waste generation in 2014 was 1.1 tons, or 5.98 pounds per person per day, a level significantly higher than EPA's estimated 2013 national rate of 4.4 pounds per person per day. In light of the State's fairly steady population growth, averaging nearly 1.0% per year since 1999, the amount of waste generated will likely continue to increase.

[1] MDE advises that it has hired a contractor to conduct a "waste sort" as recommended in MDE's report *Zero Waste Maryland – Maryland's Plan to Reduce, Reuse, and Recycle Nearly All Waste Generated in Maryland by 2040*" (December 2014). The contractor has completed a summer and fall survey and a report is anticipated in early 2017.

[2] MDE's estimates are based on data reported by permitted solid waste acceptance facilities and counties. However, due to gaps in reporting requirements, the data does not include all solid waste generated in the State. According to MDE, the reported waste does not include, among other things, some commercial and industrial waste sent through a private hauler to another state for disposal or recycling; agricultural waste managed on a farm or transported directly to another location for land application; and coal combustion byproducts transported to another site for beneficial use.

Exhibit 1.1
U.S. Municipal Solid Waste by Material
Calendar 2013



Source: U.S. Environmental Protection Agency

Import of Solid Waste

In addition to the solid waste generated in the State, Maryland facilities manage solid waste imported from several other jurisdictions. **Exhibit 1.2** shows the categories, tonnages, primary handling facilities, and places of origin of the solid waste imported in 2014. A total of 284,091 tons of the solid waste managed in Maryland in 2014 originated in other jurisdictions, an increase of 28,021 tons, or approximately 11.0%, over the previous year. However, the imported solid waste constituted only 3.7% of the total solid waste managed in Maryland. Between 2008 and 2014, the amount of imported solid waste has ranged from a low of 193,210 tons in 2010 to a high of 303,630 tons in 2012.

Exhibit 1.2
Maryland Imported Solid Waste
Calendar 2014

Solid Waste Category	Tons of Solid Waste Imported into Maryland	Primary Facility Handling in Maryland	Jurisdictions Where the Solid Waste Originated
Municipal Solid Waste	37,074	Mountainview Sanitary Landfill in Allegany County (28,598 tons)	DE; NJ; PA; VA; Washington, DC; WV
Construction and Demolition	211,368	Ritchie Reclamation Phase I and II (93,134 tons), Lawrence Street Solid Waste Acceptance Facility (52,497 tons), Sheriff Road Processing and Transfer Facility (12,610 tons), Sun Services Processing and Recycling Center in Prince George's County (8,091 tons), and Honeygo Run Reclamation Center in Baltimore County (34,107 tons)	DE; NJ; PA; VA; Washington, DC; WV
Miscellaneous	35,649		AL; CA; Canada; CT; DE; GA; KY; ME; MA; MI; NH; NJ; NY; NC; PA; RI; SC; TX; VA; Washington, DC; WV; WI
Total	**284,091**		

Source: Maryland Department of the Environment

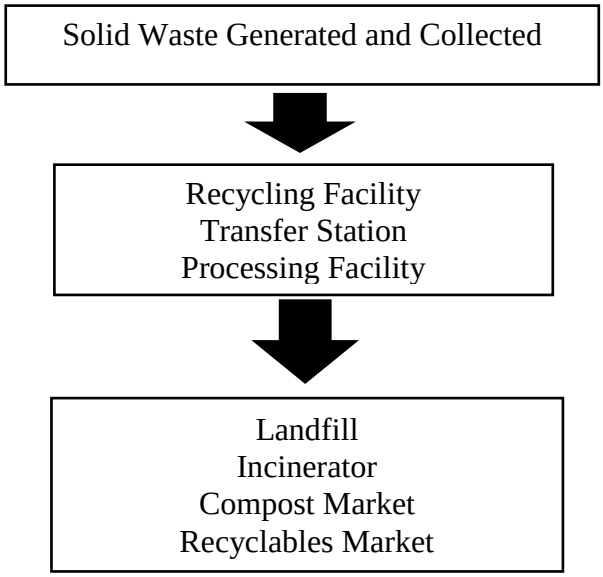
Where Does Maryland's Solid Waste Go?

In Maryland, local governments are generally responsible for managing the collection, processing, recycling, and disposal of solid waste. The process begins where the solid waste is

generated. A person may transport their own solid waste directly to a transfer station or recycling or other processing facility or place the solid waste in a container for collection by a local government or a contracted private hauler. A local government may use its own employees or a private hauler to provide collection services or may allow private haulers to contract directly with customers.

Generally, local governments are more likely to provide residential collection services in more urban counties with higher population densities, while private subscription and self-hauling are prevalent in more rural counties. After processing, the materials are transported to a landfill or incinerator for disposal, or to compost or recyclables markets for reuse. **Exhibit 1.3** provides a general overview of the solid waste management process in Maryland.

Exhibit 1.3
Waste Flow Chart



Source: Department of Legislative Services

Funding of Solid Waste Management

Local governments use a dedicated enterprise fund, general tax revenue, or a combination of both to fund their solid waste management programs. The monies come from a variety of sources, including system benefit charges, tipping fees, impact fees, interest or investment income, bond revenues, and recycled commodity revenues. In Maryland, the majority of programs use a

combination of system benefit charges and tipping fees. Impact fees from new development appear to be used only in Calvert County. **Exhibit 1.4** provides additional information about the methods of funding solid waste management programs.

Exhibit 1.4
County/Municipality Solid Waste Management Program
Funding Characteristics

Component	Description
Funding Mechanism	• Enterprise Fund – funded by a self-sustaining fund based on solid waste revenues • General Fund – funded by general tax revenue • Hybrid – funded by a combination of general tax revenue and solid waste revenues
Funding/Revenue Sources	• System Benefit Charge – annual charge billed and collected on property tax bills as a non-ad valorem special assessment (not tied to property value) • Tipping Fee – fees paid per ton or per cubic yard based on solid waste delivered to a processing or disposal facility • Impact Fee – one-time fee paid by developers or builders when a permit is received for new construction • Other – interest/investment income, bond revenues, and recycled commodity revenues

Source: Northeast Maryland Waste Disposal Authority; "Carroll County, Maryland Solid Waste Management Options," R.W. Beck (October 2005)

Export of Solid Waste

Although Maryland facilities manage some solid waste imported from other jurisdictions, the State is a net exporter of solid waste and sends a significant amount for recycling or disposal in other states. In 2014, a total of 2.3 million tons of solid waste, or 19%, of the total generated in the State, was exported. According to MDE, 41 of the permitted solid waste acceptance facilities in the State exported solid waste to destinations in 16 states in 2014, with approximately 77% going to Virginia. **Exhibit 1.5** shows the categories, tonnages, and destinations of the solid waste exported in 2014.

Exhibit 1.5
Maryland Exported Material by State Destination
Calendar 2014
(Measured in Tons)

Solid Waste Category	Virginia	Pennsylvania	Delaware	Other	Total
Municipal Solid Waste	1,024,108	353,999	0	284	**1,378,391**
Construction and Demolition Debris	522,947	52,871	7,806	1,719	**585,343**
Recycling	225,195	9,467	13,248	54,287	**302,197**
Miscellaneous	8,664	27,772	0	1,035	**37,471**
Total	**1,780,914**	**444,109**	**21,054**	**57,325**	**2,303,402**

Note: Miscellaneous includes special disposed medical waste, incinerator ash, nonhazardous industrial waste, asbestos, wastewater treatment plant sludge, and other waste.

Source: Maryland Department of the Environment

Maryland's Solid Waste Management Infrastructure

The solid waste infrastructure in Maryland consists of both permitted and nonpermitted facilities. Privately and county-owned facilities make up the majority of facilities in the State. Historically, according to MDE, recycling facilities have not been required to obtain refuse disposal permits. However, as more recycling facilities are processing substantial quantities of solid waste and the uses and size of anaerobic digestion facilities increase, there has been some interest in clarifying the circumstances in which recycling facilities require a refuse disposal permit.

Permitted Solid Waste Acceptance Facilities

As of August 2016, 81 facilities operate under refuse disposal permits issued by MDE. A refuse disposal permit is required prior to the installation, material alteration, or material extension of an incinerator, a transfer station, a landfill system or landfill, or a solid waste processing or acceptance facility. A "solid waste acceptance facility" is any sanitary landfill, incinerator, transfer station, or plant whose primary purpose is to dispose of, treat, or process solid waste. **Exhibit 1.6** provides information about the ownership of the facilities, which are primarily privately or county owned.

Exhibit 1.6
Permitted Solid Waste Acceptance Facilities by Type of Ownership
As of August 18, 2016

Type of Ownership	Count
Private	41
County	31
Municipal	3
Federal	3
Maryland Environmental Service	3
Total	**81**

Source: Maryland Department of the Environment

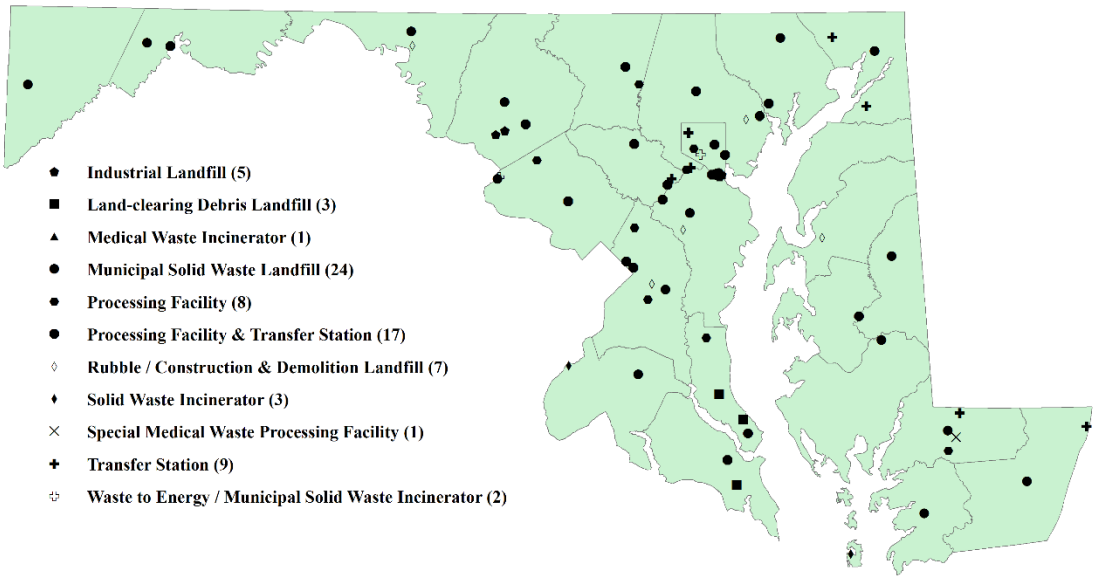
Each facility subject to a refuse disposal permit must comply with specified location, design, construction, operation, and monitoring requirements. Among other things, any installation, alteration, or extension of a refuse disposal system must be in conformity with the applicable county solid waste disposal plan. Each permitted facility also must file an annual report with MDE indicating:

- the amount of solid waste managed by category;
- where the solid waste originated, including any out-of-state jurisdictions;
- the amount of solid waste exported for disposal; and
- how the solid waste was managed (recycling, processing, incineration, landfilling, or transferring to another facility for further management or disposal).

Exhibit 1.7 depicts the landscape of permitted solid waste acceptance facilities in Maryland. Kent County, the only county that does not have a solid waste acceptance facility of some kind, is serviced by the regional Midshore II Regional Solid Waste Facility Municipal Landfill and Midshore Transfer Station.[3]

[3] The regional Midshore II Regional Solid Waste Facility Municipal Landfill and Midshore Transfer Station serves Caroline, Kent, Queen Anne's, and Talbot counties.

Exhibit 1.7
Solid Waste Acceptance Facilities in Maryland
(As of August 18, 2016)

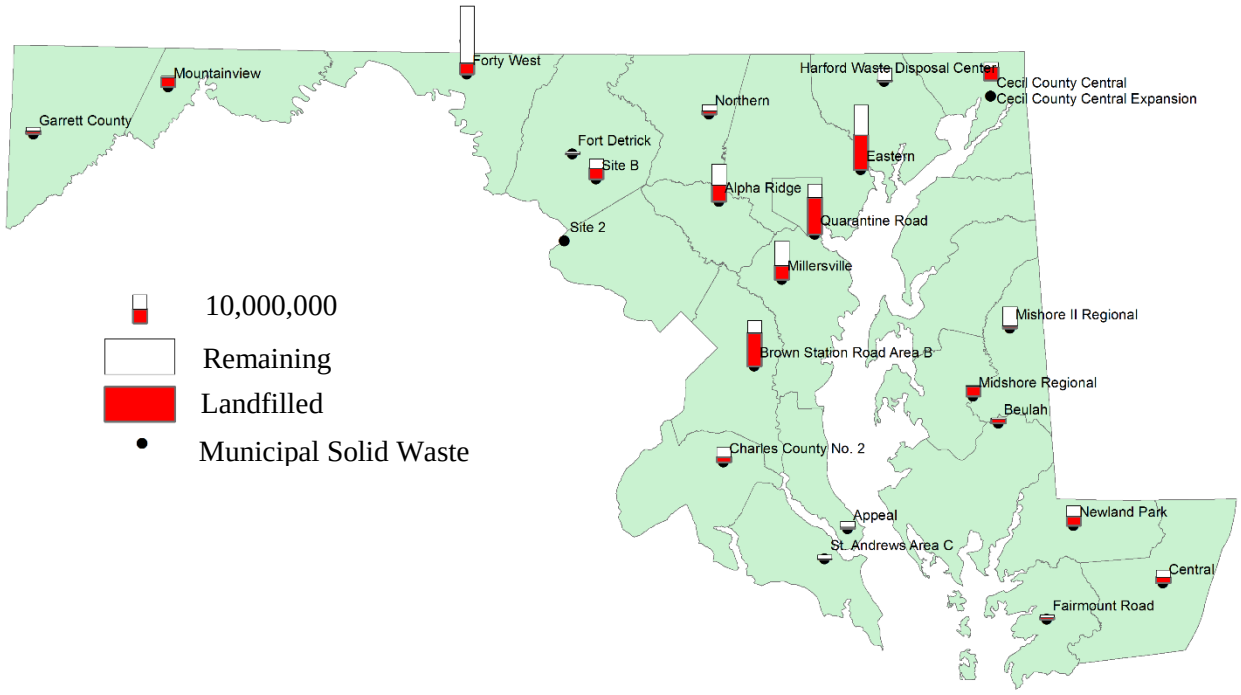


Source: Maryland Department of the Environment

More specifically, **Exhibit 1.8** depicts the municipal solid waste landfills in Maryland and the associated percentage capacity used. According to MDE, the municipal solid waste landfills have a total capacity of 52.1 million tons. MDE estimates the remaining capacity of the landfills to be 31 years at the current disposal rate of 1.7 million tons per year. Moreover, restrictions on new permits for landfills limit options for increasing capacity.[4] However, the estimate does not account for population changes, waste generation or disposal rate changes, the closure of older facilities, or the future opening of new facilities for which permits may already have been issued. In addition, the estimate does not account for the remaining capacity of other types of facilities, including: construction and demolition landfills (24 years); industrial landfills (65 years); and land-clearing debris landfills (102 years).

[4] Executive Order 01.01.2015.01, among other things, requires MDE to provide local governments with information on alternatives to landfilling and, except for permit applications submitted before January 19, 2015, prohibits MDE from issuing a permit for any new municipal or land-clearing debris landfill capacity in the State. This executive order is described in greater detail in Chapter 3 of this report.

Exhibit 1.8
Maryland Municipal Solid Waste Landfills and Percentage Filled
(As of August 18, 2016)



Source: Maryland Department of the Environment

Specialty Permitted Facilities

Natural Wood Waste

A natural wood waste recycling facility (NWWRF) permit is required to operate a facility where recycling services are provided for tree and other natural vegetative refuse, including tree stumps, limbs, brush, logs, root mats, and other natural vegetative material generated when land is cleared.[5] A NWWRF permit is not required for a collection or processing facility operated by a nonprofit or governmental organization located in the State or by an individual or a business that provides recycling services only for its own employees or for materials generated on its own premises. According to MDE, 44 facilities held NWWRF permits as of August 2016.

[5] Natural wood waste does not include yard waste derived from household gardening, landscaping, and tree trimming activities.

Sewage Sludge

A sewage sludge utilization permit is required for sewage sludge (also known as biosolids) composting and storage facilities. At the end of fiscal 2015, there were 658 permitted facilities in Maryland, although many of the permitted facilities were agricultural fields that may only receive sewage sludge once or twice during a five-year permit. As shown in **Exhibit 1.9**, 94% of sewage sludge managed in Maryland is actually generated in the State and 56% of sewage sludge is hauled out-of-state.

Composting

In addition, under regulations that became effective July 1, 2015, MDE has implemented a new program governing the permitting and operation of composting facilities.[6] Existing composting facilities that are subject to program requirements must obtain individual or general composting facility permits by December 31, 2016. Composting is described in greater detail in Chapter 3 of this report.

[6] Chapter 686 of 2013 authorized MDE to adopt regulations governing the permitting and operation of composting facilities in the State. Chapter 686 is described in greater detail in Chapter 3 of this report. The regulations are codified in COMAR 26.04.11.

Exhibit 1.9
Volume Comparison of Sewage Sludge Utilization in Maryland
Calendar 2014
(Wet Tons)

Input	
Generated in Maryland	673,402
Imported From Out-of-state	46,207
Total	**719,609**
Output	
Utilized	
Hauled Out-of-state	404,734
Distributed and Marketed	58,244
Storage	48,436
Agricultural	44,920
Landfill Utilization/Disposal	29,627
Other	12,301
Marginal	2,646
Incinerated	0
Subtotal Utilized	***600,908***
Not Utilized	
Hauled to Another WWTP	118,701
Subtotal Not Utilized	***118,701***
Total	**719,609**

WWTP: wastewater treatment plant

Note: Data includes out-of-state facilities and federal facilities in Maryland.

Source: Maryland Department of the Environment

How Maryland Manages its Solid Waste

Many factors influence how and where solid waste is collected; processed; and ultimately reused, recycled, or disposed in Maryland. In addition to the number and variety of parties involved, these factors include:

- facility permit requirements;
- permit or license requirements related to transportation, air quality, water appropriation, groundwater or surface water discharge, erosion and sediment control, or stormwater management;
- local zoning and land use plans;
- landfill capacity;
- interjurisdictional coordination and partnerships;
- federal, State, and local policies and goals; and
- economic considerations related to funding the costs of collection, transportation, processing facilities and equipment, and disposal; funding; changes in markets for recovered (recycled) materials; and job generation.

Moreover, as new technology is developed and governmental policies and goals evolve, the relative weight of each factor may change.

Exhibit 1.10 shows how Maryland's solid waste was managed in 2014. A slim majority of the solid waste, 51.7%, was recycled. The remaining 48.3% was landfilled, incinerated, or stored. Of note, on the order of 5 million tons of Maryland solid waste is handled by facilities that primarily manage only recycled materials and are not required to be permitted by the State.

Exhibit 1.10
Maryland Solid Waste Recycled vs. Not Recycled
Calendar 2014
(Measured in Tons)

Input	**Total**
Generated in Maryland	12,098,318
Imported into Maryland	284,091
Total	**12,382,409**
Output	
Recycled (includes composted)	
Recycled through Maryland nonpermitted facility	5,070,263
Recycled through Maryland permitted facility (in State)	1,313,962
Recycled through Maryland permitted facility (exported)	302,197
Adjustment for tons managed from ash, back-end scrap metal, and bypass	-193,474
Adjustment for natural wood waste disposed or stored	-88,476
Subtotal Recycled	***6,404,472***
Not Recycled	
Landfilled in a Maryland permitted facility	2,291,524
Exported through a Maryland permitted facility (for disposal)	2,001,205
Incinerated in a Maryland permitted facility	1,469,464
Stored in a Maryland permitted facility	361,454
Reported as disposed by counties, not through a Maryland permitted facility	129,822
Adjustment for tons managed from ash, back-end scrap metal, and bypass	-275,532
Subtotal Not Recycled	***5,977,937***
Total	**12,382,409**

Source: Maryland Department of the Environment

Chapter 2. Maryland's Recycling Framework

Recycling: What is it and how does it work?

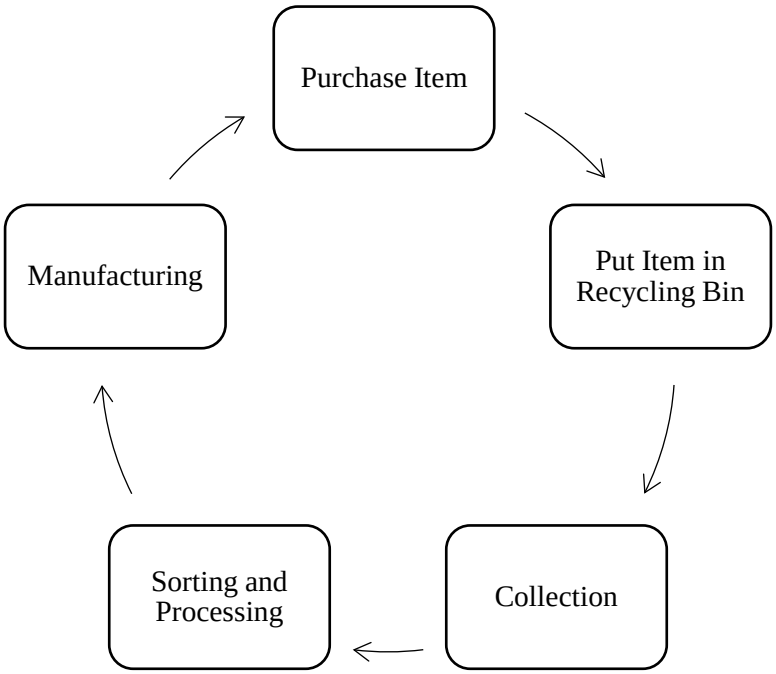
Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning those materials into new products. The materials that may be recycled vary by jurisdiction and processing facility, but the following materials are generally accepted by most processing facilities:

- aluminum (cans, foil, and pie tins);
- glass (food and beverage containers);
- paper (printer paper, newspaper, corrugated cardboard, and junk mail); and
- plastic (beverage containers and shampoo bottles).

In addition to these commonly recycled materials, there are a variety of specialty programs in the State that handle uncommon, hazardous, or difficult to recycle materials, including scrap tires, electronics, and mercury (see Non-MRA Recyclables and Specialty State Programs in this chapter for additional information on these specialty programs).

Exhibit 2.1 provides a general overview of the recycling process in the State.

Exhibit 2.1
Recycling Process



Source: Department of Legislative Services

First, a consumer purchases a product. Ideally, the consumer will choose a product with contents or packaging made from recycled materials to close the recycling loop. Next, when the consumer is finished with the product, it is either disposed of in a recycling bin to be picked up at the curb or dropped off at a processing facility. If the product is put in a recycling bin, it is then collected and taken to a processing facility. The processing facility sorts, cleans, and processes the product into materials that can be used in manufacturing.

Recyclables are bought and sold just like raw materials would be, so the quality of the processed materials is very important – contamination of recyclables by food, nonrecyclable products, or other debris can have a significant impact on a processing facility's ability to sell the material and may ultimately result in the recyclable material going to a landfill rather than being recycled. Finally, the material is manufactured into a new product, and the recycling process beings again.

Maryland Recycling Act

Recycling Policy

Maryland's recycling policy is guided by the Maryland Recycling Act (MRA), established by Chapter 536 of 1988. The MRA sets mandatory recycling rates for State government and local jurisdictions in the State, as well as a voluntary statewide recycling goal of 55% by 2020. The mandatory recycling rates were increased in 2012, as shown below in **Exhibit 2.2**.

Exhibit 2.2
Maryland Recycling Act Mandatory Recycling Rates

	Recycling Rate per Chapter 536 of 1988	Recycling Rate per Chapter 692 of 2012
Counties with a population less than 150,000	15%	20%
Counties with a population greater than 150,000	20%	35%
State government	20%	30%

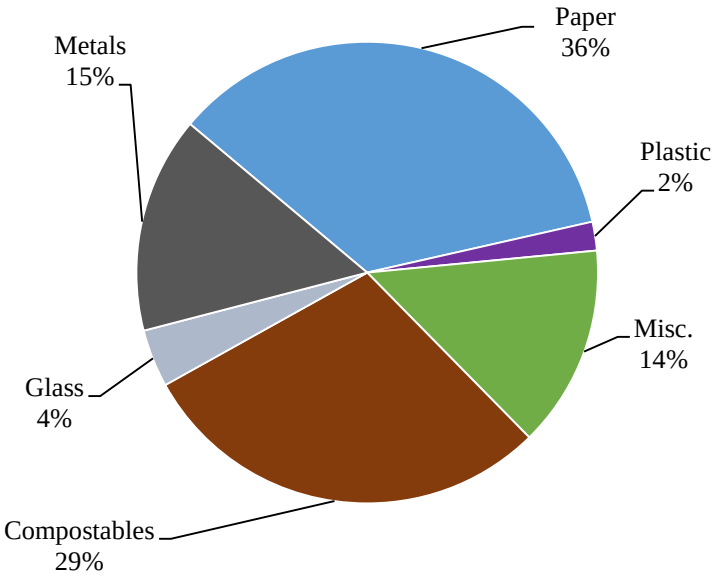
Source: Department of Legislative Services

The MRA defines recyclable material as any material that (1) would otherwise become solid waste for disposal in a refuse disposal system and (2) may be collected, separated, composted, or processed and returned to the marketplace in the form of raw materials or products. Scrap metal, land-clearing debris, construction and demolition debris, sewage sludge, hospital waste, and waste generated by a single individual or business and disposed of in a facility dedicated solely for that entity's waste are not considered recyclable materials.[7] Additionally, the Maryland Department of the Environment (MDE) has interpreted the MRA to exclude from recycling waste-to-energy incineration, gasification, and similar technologies that destroy waste for energy generation. However, MDE does consider anaerobic digestion as producing recyclable material if the digestate is returned to the market, such as a soil amendment or as an input to a composting process. MDE has reported that this method is in line with the U.S. Environmental Protection Agency's (EPA) guidance on measuring recycling. Additional information about anaerobic digestion may be found in Chapter 3 of this report.

[7] These materials are discussed in Non-MRA Recyclables and Specialty State Programs in this chapter.

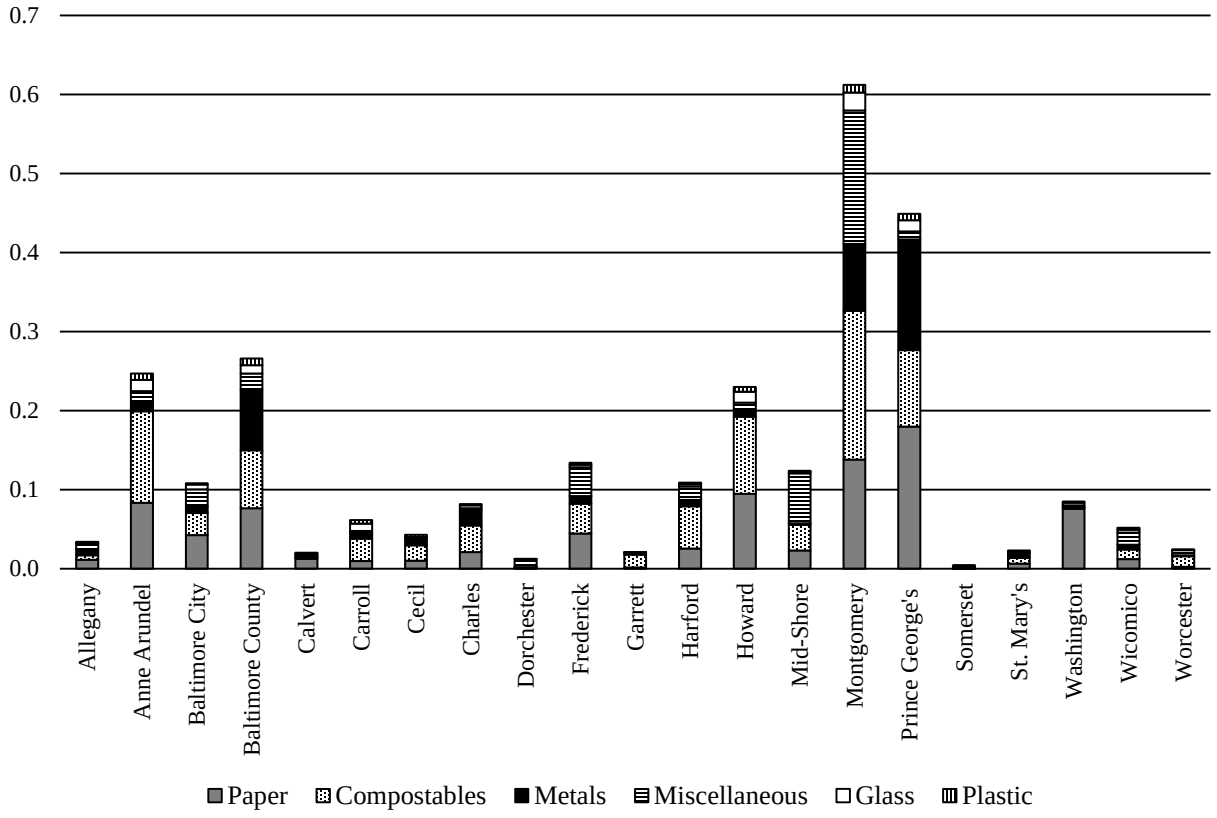
Exhibit 2.3 depicts the statewide composition of MRA's recyclable materials for 2014, and **Exhibit 2.4** reflects this composition for each jurisdiction in the State.

Exhibit 2.3
Maryland Recycling Act Materials
2014



Source: Maryland Department of the Environment

Exhibit 2.4
Maryland Recycling Act Recyclables by Material
Calendar 2014
(Tons in Millions)



Source: Maryland Department of the Environment

Recycling Plans

Generally

The MRA requires that each county (including Baltimore City) prepare a recycling plan that addresses how the jurisdiction will achieve its mandated recycling rate. The plan must be submitted to MDE for approval when the jurisdiction submits its water and sewerage plan at least once every 10 years. The plan must address a variety of topics associated with recycling, including methods to reduce the solid waste stream; the feasibility of source separation of the solid waste stream generated within the county; and the strategy for the collection, processing, marketing, and disposition of recyclable materials.

Apartment Buildings and Condominiums

Recycling must be provided for residents of apartment buildings and condominiums that contain at least 10 dwelling units. A jurisdiction's recycling plan includes the collection and recycling of recyclable materials from residents of these apartment buildings and condominiums and, if applicable, a method for implementing a reporting requirement for recyclable materials generated at these apartment buildings and condominiums. A county may require that recycling activities at an apartment building or condominium be reported to the county, and the recycling activities must be in accordance with the recycling plan for the county in which the apartment building or condominium is located. These requirements do not apply to an apartment building or condominium located in Ocean City.

Special Events

Each jurisdiction's recycling plan must also address the collection and recycling of recyclable materials from special events.[8] The organizer of a special event must provide a recycling bin next to each trash can at the event that is clearly distinguishable from the trash can and ensure that all recyclable materials in the recycling bin are collected for recycling. A county may require that the organizer of a special event report recycling activities to the county, and the recycling activities must be in accordance with the recycling plan for the county in which the special event takes place.

Recycling Rates

Recycling rates for the State are calculated using the following formula:

$$\frac{\text{MRA recycling tonnage + resource recovery facility credit}}{\text{MRA recycling tonnage + MRA waste}}$$

Each local jurisdiction reports MRA recycling tonnages annually to MDE. The MRA allows each jurisdiction to add 5% to its recycling rate (also known as the resource recovery facility credit) if the jurisdiction achieves a reduction of at least 5% in the volume of its waste through the utilization of one or more resource recovery facilities in operation as of January 1, 1988.[9] Lastly,

[8] "Special event" means an event that (1) includes temporary or periodic use of a public street, publicly owned site or facility, or public park; (2) serves food or drink; and (3) is expected to have 200 or more persons in attendance (§ 9-1712(a)(1) of the Environment Article).

[9] In 2013, jurisdictions were able to begin receiving the 5% resource recovery facility credit. While the credit has existed since 1988, in recent years, jurisdictions agreed to forgo the credit when municipal incinerator ash recycling exceeded the 5% credit. However, as of 2013, ash used as landfill alternate daily cover material may no longer be counted as recycling. Due to this change, and a review of the MRA at the request of the Northeast Maryland Waste Disposal Authority, the resource recovery facility credit is being issued for the first time in over 15 years. Based on 2012 data, Anne Arundel, Baltimore, Harford, and Worcester counties and Baltimore City are eligible for the credit.

MRA waste is composed of municipal solid waste plus industrial waste from nonprivate industrial waste landfills.

As shown in Exhibit 2.2, Chapter 692 of 2012 increased the initial recycling rates required by the MRA. According to MDE, as of 2014, most counties were already meeting these increased rates, also shown in **Exhibit 2.5**.

Exhibit 2.5
Current County Recycling Rates and New Mandatory Rates Required by Chapter 692 of 2012

County	2014 Recycling Rate	Required December 2015 Recycling Rate
Allegany	40.7%	20.0%
Anne Arundel	37.9%	35.0%
Baltimore City	20.4%	35.0%
Baltimore	33.6%	35.0%
Calvert	31.5%	35.0%
Carroll	37.6%	20.0%
Cecil	41.3%	35.0%
Charles	51.2%	35.0%
Dorchester	27.9%	20.0%
Frederick	50.4%	35.0%
Garrett	50.7%	20.0%
Harford	47.6%	35.0%
Howard	45.1%	35.0%
Mid-shore*	53.9%	20.0%
Montgomery	55.7%	35.0%
Prince George's	59.0%	35.0%
Somerset	20.2%	20.0%
St. Mary's	40.2%	20.0%
Washington	60.6%	35.0%
Wicomico	35.9%	20.0%
Worcester	26.8%	20.0%

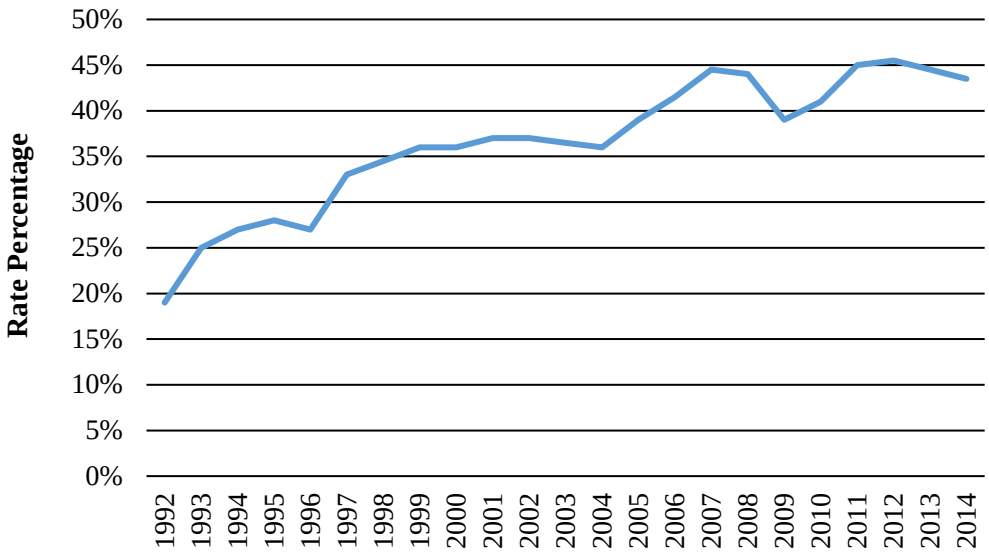
* Mid-shore includes Caroline, Kent, Queen Anne's, and Talbot counties.

Source: Maryland Department of the Environment

According to MDE, Maryland's recycling rate has generally increased since 1992, with periodic, temporary downturns that may correlate with economic cycles. In 2014, Maryland recycled 43.5% of the municipal solid waste generated, down 1.0% from the State's 2013 recycling

rate, and 2.0% from 2012.[10] **Exhibit 2.6** depicts Maryland recycling rates from 1992 through 2014. Using both MDE and EPA calculation methods, despite a slight decrease in recycling over the past few years, Maryland still recycles more per person than the U.S. average, at 2.68 pounds recycled per person per day in 2013 compared with 1.51 pounds per person per day for the United States as a whole.[11]

Exhibit 2.6
Maryland Recycling Rates from 1992-2014



Source: Maryland Department of the Environment

While the State is exceeding the general national recycling rate, Maryland still has room for improvement. The MRA has a statewide voluntary recycling goal of 55.0% by 2020 – an attainable goal with increased effort from local jurisdictions. Additionally, the paper recycling rate of 50.7% lags behind the U.S. average of 65.6% in 2011. With paper making up over 25.0% of the waste disposed of in the State each year, capturing additional tonnage would have a significant impact on waste disposal. As shown in **Exhibit 2.7**, opportunities exist to improve the recycling of yard trimmings, food scraps, paper, and plastic, which together comprise nearly 80.0% of all waste disposed of in the State.

[10] EPA's recycling rate for Maryland is 38.4% (2014). This is because EPA has developed recycling criteria to standardize which materials count toward the recycling rate to compensate for the fact that different states' recycling rates include different materials. EPA's recycling rate for Maryland exceeds EPA's recycling rate goal of 35.0% by 2008.

[11] Using EPA's calculation method, Maryland recycles 2.23 pounds per person per day.

Exhibit 2.7
Estimated 2012 Recycling Rates for Selected Materials

Material	Estimated Recycling Rate	Percent of Waste Stream	Tons Left to Capture	Percent of Waste Disposed
Yard trimmings	70.9%	13.5%	256,805	7.2%
Food scraps	8.5%	14.5%	870,435	24.3%
Paper	50.7%	28.0%	904,986	25.3%
Plastic	8.6%	12.7%	672,487	21.3%

Source: Maryland Department of the Environment, *Zero Waste Maryland*, December 2014

State Government Recycling – All State Agencies Recycle

The MRA requires the Office of Recycling within MDE, in cooperation with the Department of General Services (DGS) and other State agencies, to develop a recycling plan for State government that recycles at least 20% of the solid waste stream generated for disposal by the State government, or to an amount that is determined practical and economically feasible, but not less than 10%. In 2012, these rates were increased to 30% and 15%, respectively. In an effort to lead by example, MDE has requested that each State agency set a recycling goal of at least 40% in the 2015 recycling plan update.

An agency's recycling plan must include a system for recycling aluminum, glass, paper, and plastic, and each agency must implement the plan achieving the updated recycling rates by July 1, 2014. Each agency's recycling plan is on file with MDE.

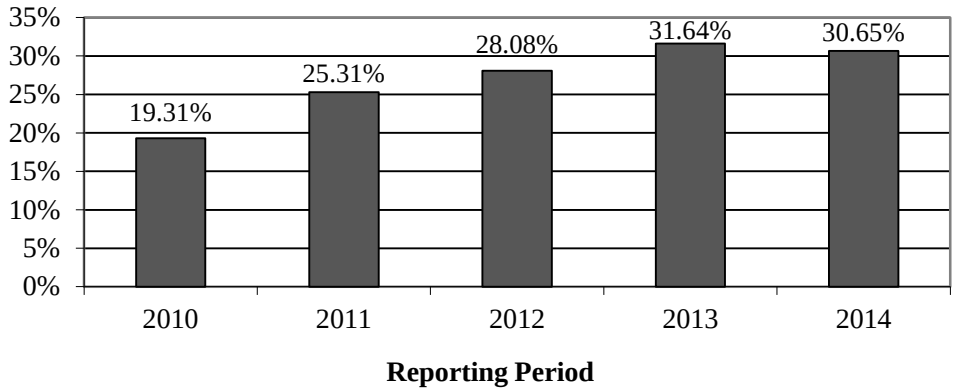
To assist with implementing the All State Agencies Recycle (All StAR) program, each agency is encouraged to designate a recycling coordinator to manage recycling activities at the agency's various sites throughout the State. The recycling coordinators provide technical support to encourage recycling and facilitate reporting of collection activities, and are responsible for maintaining the agency's individual site recycling plans. MDE acts as the administrator of the All StAR program, maintains all statistical data relating to the program, provides technical support and on-site expertise, publishes a newsletter devoted to recycling in State government, and forwards any relevant recycling information to the appropriate State offices.

State government has achieved the new 30.0% recycling rate, recycling more than 35,593 tons of MRA materials in 2014 for a recycling rate of 30.65%, as shown in **Exhibit 2.8**. State agencies also recycled more than 141,068 tons of non-MRA materials in 2014.[12] MDE has

[12] Additional 2014 All StAR statistics are available under "State Agency Recycling" on MDE's website at http://www.mde.maryland.gov/recycling.

found that the largest obstacle to increasing the All StAR recycling rate even more is the ability to contract with a recycling contractor to offer recycling pick-up service at a reasonable price. This obstacle is being addressed by requiring that recycling be integrated into State office space leases issued through the Lease Management and Procurement Division of DGS and associated janitorial contracts.

Exhibit 2.8
All StAR Recycling Rate
(2010-2014)



Source: Maryland Department of the Environment

Waste Diversion

Waste diversion is the process of eliminating waste before it is created. In Maryland, waste diversion is defined as the amount of waste recycled or diverted from entering the waste stream through source reduction activities. The MRA set an initial voluntary waste diversion goal of 40% by 2005. This voluntary goal was increased in 2012 to 60% by 2020.

The waste diversion rate is calculated using the following formula:

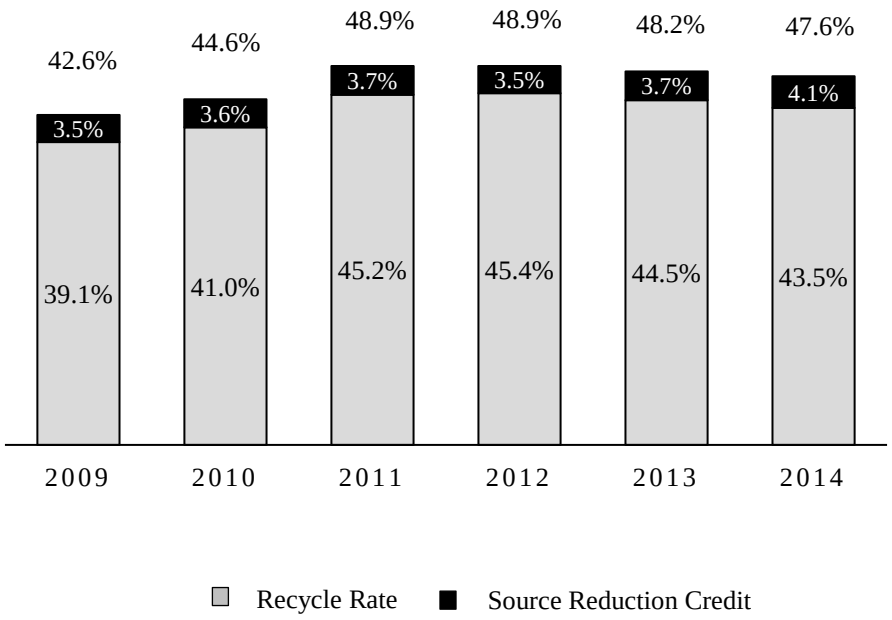
Recycling rate + Source reduction credit

The source reduction credit allows a jurisdiction to add up to 5% to their waste diversion rate by taking certain source reduction actions, such as running demonstration sites, outreach and

education, and food composting. In 2014, 14 jurisdictions were able to add source reduction credits to their waste diversion rate by taking source reduction actions approved by MDE.[13]

In 2014, the State's waste diversion rate was 47.6%, composed of a 43.5% recycling rate and a 4.1% source reduction credit. While this exceeds the 2005 goal of 40.0%, it falls short of the 60.0% by 2020 goal. **Exhibit 2.9** shows the State's waste diversion rate from 2009 through 2014.

Exhibit 2.9
Waste Diversion Rates
2009-2014



Source: Maryland Department of the Environment

[13] The 14 jurisdictions that claimed source reduction credits in 2014 are: Allegany (2%); Anne Arundel (4%); Baltimore City (4%); Baltimore (5%); Carroll (5%); Cecil (4%); Charles (5%); Frederick (5%); Garrett (2%); Harford (5%); Howard (4%); Montgomery (5%); Prince George's (5%); and St. Mary's (4%).

Accountability, Reporting, and Enforcement

Local Jurisdictions: Responsibilities

Each local jurisdiction, rather than the State, has direct responsibility for carrying out recycling and solid waste programs within its jurisdiction. Jurisdictions select the materials to be recycled and the manner in which the materials are separated and processed. Jurisdictions that achieve the required recycling rate must submit an annual report to MDE that includes the amount of solid waste collected and disposed of, the disposal methods used for disposing of solid waste, the amount and types of materials recycled, and the percentage reduction in the jurisdiction's solid waste stream. Jurisdictions that do not achieve the required recycling rate must submit the same report to MDE on a biannual basis. If a jurisdiction determines that it cannot achieve the required recycling rate, the jurisdiction must hold a public hearing on the proposed reduction and meet specified public notice requirements.

Secretary of the Environment: Responsibilities

The Secretary of the Environment approves each local jurisdiction's recycling plan. If a jurisdiction has determined that it cannot achieve the required recycling rate, the Secretary must review the jurisdiction's recycling plan and determine whether the jurisdiction's maximum recycling goal that is stated in its recycling plan has a reasonable basis. The jurisdiction must revise its recycling plan if the Secretary determines that the jurisdiction's maximum recycling goal is unsupported by competent, material, and substantial evidence in light of the entire plan as submitted.

Office of Recycling: Responsibilities

Under the MRA, MDE's Office of Recycling is responsible for assisting each local jurisdiction with the development of the jurisdiction's recycling plan and coordinating the efforts of the State to facilitate implementation of recycling goals at the county level. The Office of Recycling reviews each jurisdiction's recycling plan, advises the Secretary on the adequacy of each recycling plan, and keeps track of MRA recycling statistics.

The Office of Recycling, in coordination with the Maryland Environmental Service (MES), also studies and submits an annual report to the Governor and the General Assembly detailing waste diversion (recycling and source reduction) in the State.[14] The waste diversion portion of the Maryland Solid Waste Management and Diversion Report provides information on programs covered by Maryland's waste diversion legislation, including local jurisdiction recycling and

[14] Section 9-1702(e) of the Environment Article requires that the Office of Recycling submit a biannual waste diversion and recycling report to the Governor and the General Assembly. Beginning in 2009, the *Maryland Waste Diversion Activities* report and the *Solid Waste Managed in Maryland* report were combined into one report, which has been submitted annually to comply with the reporting requirements for the solid waste report under § 9-204(n) of the Environment Article. However, data from 2013 was not reported until 2015, and 2014 and 2015 data has not yet been reported.

source reduction data for the year and an overview of the State's technical assistance activities for the fiscal year. To assist with the preparation of the annual report, the Office of Recycling is required to continuously study various aspects of waste diversion, including the availability of markets for recycled materials, the economics and financing of existing and proposed systems of waste disposal and recycling, and programs necessary to educate the public on the need to participate in recycling efforts.

Enforcement

A person that violates a provision of the MRA is subject to a civil penalty of up to $10,000 for each day that the violation exists and an administrative penalty of up to $10,000 for each day that the violation exists but not exceeding $100,000 total. Additionally, State and local authorities may prohibit the issuance of building permits for all new construction in a jurisdiction that fails to meet its required recycling rate.

With respect to the recycling requirements for apartment buildings, condominiums, and special events, an enforcement unit, officer, or official of a county, municipality, or other local government may conduct inspections of an apartment building, condominium, or a special event location to enforce applicable statutory requirements. A person that violates specified recycling requirements is subject to a civil penalty of up to $50 for each day that the violation exists.

Local Implementation of the MRA

As noted above, while the MRA sets mandatory recycling rates for the State and its jurisdictions, the counties are the primary locus of responsibility for implementing the MRA mandates. The two major components of recycling are (1) the collection of recyclables and (2) the processing of the recyclables.

Collecting Recyclable Materials

Collecting recyclable materials can be accomplished through either curbside recycling by haulers that visit each household or by households taking recyclables to a central drop-off facility. Collecting the recyclables can be further delineated into dual stream recycling (paper is separated from other recyclable materials) and single stream recycling (all recyclable materials are commingled). The structure of local recycling programs in the State is shown in **Exhibit 2.10**. The recycling needs across the State vary according with factors such as population density, education, and fiscal health. For instance, Garrett and Allegany counties have low population densities and, thus, have drop-off locations for recyclables,[15] while Baltimore City has a large population and high population density, and therefore uses curbside recycling.

[15] The city of Cumberland in Allegany County does offer curbside collection of recyclables.

Exhibit 2.10
County Recycling Collection Information
Calendar 2014

		Curbside Recycling		Drop-off Recycling Facility		
County	**MRA Rate (%)**	**Dual Stream**	**Single Stream**	**Dual Stream**	**Single Stream**	**Additional Information**
Allegany	40.71%			X		Pay-as-you-throw Program[1]
Anne Arundel	37.88%		X			
Baltimore City	20.44%		X			
Baltimore County	33.63%		X			
Calvert	31.50%				X	Some individual towns offer single stream
Carroll	37.60%			X		
Cecil	41.34%		X			
Charles	51.23%		X			Pay-as-you-throw Program
Dorchester	27.91%			X		
Frederick	50.40%		X			
Garrett	50.72%			X		
Harford	47.56%		X			Pay-as-you-throw Program only in Aberdeen
Howard	45.05%		X			
Mid-shore[2]	53.92%			X		
Montgomery	55.71%	X				
Prince George's	59.03%		X			
Somerset	20.21%				X	
St. Mary's	40.20%				X	
Washington	60.59%			X		
Wicomico	35.92%	X				
Worcester	26.82%			X		

MRA: Maryland Recycling Act

[1] Pay-as-you-throw is a pricing model for waste disposal in which the users are charged a rate based on the amount of waste dropped off at a drop-off recycling facility.
[2] Mid-shore includes Caroline, Kent, Queen Anne's, and Talbot counties. Recyclables in these counties are collected by the Maryland Environmental Service.

Source: Maryland Department of the Environment

Processing Recyclable Materials

The materials recovery facility (MRF) is the primary entity that processes recyclables. As shown in **Exhibit 2.11** for select jurisdictions, there are two ways MRFs are owned and operated in Maryland. For the counties shown, the main distinction in MRF *ownership* is between the county and Waste Management (WM) Recycle America, and the main distinction in MRF *operation* is between MES and WM Recycle America.

Exhibit 2.11
Select Materials Recovery Facility Details

Jurisdiction	Facility Owned	Facility Operated
Anne Arundel	WM Recycle America	WM Recycle America
Baltimore	County	MES
Carroll	WM Recycle America	WM Recycle America
Frederick	WM Recycle America	WM Recycle America
Howard	WM Recycle America	WM Recycle America
Montgomery	County	MES
Prince George's	County	MES

MES: Maryland Environmental Service
WM: waste management

Source: Northeast Maryland Waste Disposal Authority

MES is an instrumentality of the State and is a fee-for-service public corporation that receives no direct appropriation and has no regulatory authority. MES contracts directly with government (including the State and counties), as well as private-sector clients to conduct projects ranging from water and wastewater treatment, composting, recycling, managing dredged material to renewable energy.

The Northeast Maryland Waste Disposal Authority (NMWDA) also handles waste management and recycling in the State by working with participating counties to create a regional waste disposal program. The authority plans and develops waste management systems in Baltimore City and Anne Arundel, Baltimore, Carroll, Frederick, Harford, Howard, and Montgomery counties. It also assists member jurisdictions with waste-related projects such as recycling and composting.

Financing Recycling

State Recycling Trust Fund

The State Recycling Trust Fund is funded via a newsprint recycling fee, a telephone directory recycling fee, the electronic device manufacturer registration fee, the mercury switch fee and associated fines and penalties, fines and penalties collected under the authority of the Office of Recycling, and any money appropriated to it in the State budget. The fund is used for grants to counties to develop and implement recycling plans, and grants to counties that have separate collection and recycling for covered electronic devices.

Source of Funds on the Local Level

County financing of recycling programs varies widely. A survey of counties in the NMWDA found programs funded via the county's general fund or the operation of an enterprise fund, with Carroll County combining the two methods. Depending on the county, funds come from a wide variety of sources, including residential charges, tipping fees from haulers, bonding, the sale of recyclables, and landfill gas revenues.

Non-MRA Recyclables and Specialty State Programs

Jurisdictions in Maryland recycle materials beyond those that are counted as recyclables under the MRA. MDE collects this information, but because non-MRA recyclables do not count toward a jurisdiction's mandatory recycling rate, information submitted is often incomplete. In 2014, nearly 3.7 million tons of non-MRA recyclables were reported as recycled. **Exhibit 2.12** provides a categorical breakdown of the materials reported.

There are several programs and requirements for the disposal or recycling of uncommon, hazardous, difficult to recycle, or large volumes materials in Maryland.

- **Scrap Tires:** MDE regulates businesses that collect, store, recycle, process, and have scrap tires; it is also responsible for the statewide scrap tire recycling system. An $0.80 per tire fee is collected for MDE's Used Tire Cleanup and Recycling Fund to support the Scrap Tire Program. Scrap tires can be recycled for use in playgrounds, sound absorption materials in highway sound barriers, and alternative materials in civil engineering projects.

- **Electronics:** State law requires certain manufacturers of electronics to register with MDE and pay an annual fee if they sell electronic devices covered by the State's eCycling legislation, including computers, computer peripheral devices, and video display devices larger than four inches. Some manufacturers will take back their

devices for recycling, and there are various private companies that will take devices for recycling. Several counties also offer electronic recycling options for their residents.

- **Mercury:** MDE regulates the sale of mercuric oxide batteries, and State law bans the sale of thermostats containing mercury. In 2009, legislation was passed requiring motor vehicle manufacturers to develop a mercury minimization plan that included information on mercury switch removal from motor vehicles. The law also requires a motor vehicle recycler to remove mercury switches from motor vehicles at the end of their life.

- **Newspapers and Telephone Directories:** State law requires that newspaper and directory publishers in the State use at least 40% by weight recycled newsprint. Publishers are charged $10 per ton for each ton below that goal.

- **Labeling of Plastic Containers:** State law requires that plastic containers for sale must be labeled indicating the plastic resin – including polyethylene terephthalate, high density polyethylene, polystyrene, and others – used to produce the container.

Exhibit 2.12
Non-MRA Recycled Materials
Calendar 2014

Material	Tons Recycled
Antifreeze	1,638
Asphalt and Concrete	875,093
Coal Ash	578,481
Construction/Demolition Debris	465,123
Land-clearing Debris	167,604
Scrap Automobiles	154,120
Scrap Metal	598,157
Sewage Sludge	157,992
Soils	600751
Waste Oil	33,104
Other Materials	36,132
Total	**3,668,195**

MRA: Maryland Recycling Act

Source: Maryland Department of the Environment

Chapter 3. Recent Initiatives and Legislation in Maryland

Recent Initiatives

Zero Waste

Zero waste, as described by the Maryland Department of the Environment (MDE), is a comprehensive strategy comprised of short- and long-term measures designed to nearly eliminate the need for waste disposal facilities by 2030 by reducing the generation of waste and increasing reuse and recycling. It involves rethinking the way products are designed in order to prevent or reduce waste before it ever occurs. Discards that cannot be avoided should be designed for efficient recovery through recycling. Throughout their lifecycles, materials should be used and managed in ways that preserve their value, minimize their environmental impacts, and conserve natural resources. Ultimately, products that cannot be redesigned or recycled should be replaced with alternatives.

Zero Waste Strategy

To address the problem of dwindling capacity in municipal landfills statewide, Maryland is pursuing a zero waste strategy. This strategy was first discussed as part of the State's plan to reduce greenhouse gas emissions. Under the Greenhouse Gas Reduction Act of 2009 (Chapters 171 and 172), MDE published a final greenhouse gas reduction plan[16] (Greenhouse Gas Plan) in July 2013. The extensive plan includes strategies, programs, and initiatives that, in combination, are projected to achieve a 25.0% reduction of greenhouse gas emissions from 2006 levels by 2020. One of the major strategies included in the Greenhouse Gas Plan is a zero waste initiative, which is estimated to provide 8.7% of the emissions reductions – the fourth largest component of the plan. Under the Greenhouse Gas Plan, zero waste is a concept that calls for the near complete elimination of solid waste sent to landfills or incinerators for disposal, and where, instead, the vast majority of Maryland's solid waste is reused, recycled, composted, or prevented through source reduction.

In 2014, the State released *Zero Waste Maryland – Maryland's Plan to Reduce, Reuse and Recycle Nearly All Waste Generated in Maryland by 2040* (Zero Waste Plan), which is intended to broaden the State's focus on recycling and increase emphasis on source reduction and reuse.[17] The Zero Waste Plan lays out specific action items including increasing source reduction and reuse; increasing recycling access and participation; increasing diversion of organics, addressing specific target materials; incentivizing technology innovation and developing markets; and recovering energy from waste.

[16] The 2015 Greenhouse Gas Emissions Reduction Act Plan Update is available on MDE's website.

[17] The *Zero Waste Maryland – Maryland's Plan to Reduce, Reuse and Recycle Nearly All Waste Generated in Maryland by 2040* is available at http://www.mde.state.md.us/programs/Marylander/Documents/Zero_Waste_Plan_Draft_12.15.14.pdf.

The following year, Governor Martin J. O'Malley issued Executive Order 01.01.2015.01, titled *Zero Waste Plan for Maryland*, which reiterated major goals from the Greenhouse Gas Plan. The executive order establishes goals of 85% waste diversion and 80% recycling in the State by 2040.[18] It requires State government to (1) achieve a waste recycling rate of at least 65% by 2020 and (2) divert at least 60% of its organic waste through recycling, composting, or anaerobic digestion by 2020. It requires MDE, in consultation with the Maryland Green Purchasing Committee, to create a source reduction checklist for use by State agencies to track and encourage source reduction by December 1, 2015. Finally, the executive order prohibits MDE from issuing a permit for any new municipal or land-clearing debris landfill capacity in the State, except for permit applications submitted to MDE before January 19, 2015.

Implementing the Zero Waste Plan

The Zero Waste Plan contains over 60 specific initiatives that fall under eight broad objectives. However, the State has made very limited progress in implementing the initiatives in the plan. Progress has been made with regard to composting and a "Waste Sort," which are described below.

Composting Regulations and Permitting: In July 2015, MDE implemented regulations that established requirements for constructing and operating composting facilities in the State (Chapter 686 of 2013), which was a stated objective of the Zero Waste Plan. Further, in spring 2016, MDE created a general permit for composting and has begun to issue permits for these facilities. The general permit allows for an easier and more streamlined application and permit process to promote composting in the State.

Waste Sort: Another initiative that is underway within MDE is the completion of a Waste Sort. According to the Zero Waste Plan, Maryland receives reports of material-specific recycling volumes, but does not receive a similar breakdown for waste disposal.[19] As a result, and as previously discussed in Chapter 1 of this report. MDE must extrapolate from the U.S. Environmental Protection Agency waste generation information for the entire country to draw conclusions about specific materials in Maryland. The main disadvantage to using this method is that it assumes Maryland's waste stream is identical to the waste stream in the country as a whole.

A Zero Waste Plan initiative is to obtain more accurate empirical information about the type of materials that need to be targeted for increased recycling in Maryland. To that end, MDE is currently contracting with Northeast Maryland Waste Disposal Authority (NMWDA) to conduct a State-specific Waste Sort. The Waste Sort will identify the types of materials that are disposed

[18] Available on the Maryland General Assembly's website http://mgaleg.maryland.gov/Pubs/LegisLegal/2015-executive-orders.pdf, pages 1 through 3.

[19] This information is found on page 47 of the Zero Waste Plan and was updated by MDE on September 27, 2016.

of, as well as the volume, and provide for a material-specific breakdown of wastes disposed of in the State.

Recent Legislation

Legislation related to waste management and recycling is regularly introduced in the General Assembly. **Exhibit 3.1** shows waste management and recycling legislation that has been enacted within the past five years.

Exhibit 3.1
Waste Management and Recycling Legislation Enacted Within the Past Five Years

Year	Chapter(s)	Summary
2012	Chapters 191 and 192	Requires the property owner or manager of an apartment building or the council of unit owners of a condominium containing 10 or more units to provide for the collection and removal of recyclable materials by October 1, 2014.
2012	Chapter 400	Makes various changes to the existing Statewide Electronics Recycling Program, including altering registration exemptions, fees, and penalties; and requires the Secretary of the Environment to convene a specified workgroup.
2012	Chapter 692	Increases the reduction through recycling targets that must be included in a county recycling plan; increases the reduction through recycling requirements for the State government; and establishes a voluntary statewide recycling goal of 55% by 2020 and a voluntary statewide waste diversion goal of 60% by 2020.
2013	Chapter 602	Exempts a property owner or manager of an apartment building or a council of unit owners of a condominium in Ocean City from the recycling requirements of Chapters 191 and 192 of 2012.
2013	Chapter 686	Requires the Maryland Department of the Environment (MDE) to adopt regulations governing the permitting and operation of composting facilities and prohibits a person from operating a composting facility that is not in accordance with

Year	Chapter(s)	Summary
		the regulations or any permit or order issued by MDE; and provides for the enforcement of State composting laws and regulations through existing enforcement provisions in the Environment Article.
2014	Chapter 459	Authorizes Wicomico County to become a participating county in the Northeast Maryland Waste Disposal Authority.
2014	Chapter 338	Requires the organizer of a specified type of special event to provide for the collection of recyclable materials; requires each county, as part of their currently required recycling plans, to address the collection and recycling of recyclable materials from special events by October 1, 2105; and establishes penalties for violations.
2014	Chapter 430	Establishes the use of compost and compost-based products in highway construction projects in the State as a best management practice for erosion and sediment control, as well as post-construction stormwater management; and requires the State Highway Administration to establish related specifications.

Source: Department of Legislative Services

In addition, with the exception of bills related to composting, other waste management and recycling legislation has been introduced over the past few years, but has not passed. The remaining part of this section provides an overview of legislation that would have (1) established bottle deposit programs; (2) created plastic bag bans and fees; (3) clarified regulation of the biological treatment of waste, including composting; (4) required the establishment of various stewardship programs; and (5) expanded authority for NMWDA to fund and use resource recovery parks. In some cases, bills related to these topics have been, and continue to be, introduced for several years in a row.

Bottle Deposit Programs

According to MDE, beverage containers make up approximately 5.6% of the total municipal solid waste stream by weight, but may make up a larger portion of litter. Further, MDE states that in 2014, the recycling rate for beverage containers was estimated at 50.9%. The Zero Waste Plan includes an objective to implement a phased-in ban on disposal of recyclables, including plastic bottles. The Zero Waste Plan also explores the possibility of Enhanced Producer

Responsibility (EPR) for packaging, including plastic bottles.[20] EPR puts responsibility on producers to ensure that products are responsibly collected and disposed of or recycled.

In general, under a bottle deposit program, distributors collect a deposit for each container purchaed by a retailer. This cost is then passed on to the consumer at the time of purchase. When the bottle is returned to a supermarket or other redemption center, the consumer receives a reimbursement.

Prior to publication of the Zero Waste Plan, in December 2011, the University of Maryland Environmental Finance Center issued a report for the Abell Foundation and the Waterfront Partnership of Baltimore, Inc., to quantify a beverage container deposit program's contribution to Maryland's goals to reduce greenhouse gas emissions and stormwater-related trash and to determine what money might be available to the State as a result of unredeemed beverage container deposits. The report noted the potential for litter reduction and an increase in recycling from a beverage container deposit program, but also acknowledged a potential negative impact on local recycling programs and potential concerns about handling costs. In conclusion, the report noted that the economic outcomes of a program would vary based on the design of the program. Finally, the report indicated that maximizing the benefits of container deposit legislation depends on achieving high recycling rates, and that minimizing the costs of container deposit legislation depends on an efficient return system.

Legislation that would have created beverage container deposit programs in the State has been introduced in each of the past six years. The main difference between each bill is whether the government, the private sector, or a hybrid public/private entity like the Maryland Environmental Service (MES) or a benefit corporation operates the program. Overall, the following variables related to a bottle bill will likely continue to garner debate: (1) who will operate the overall redemption program; (2) the level of the handling fee for redemption centers; and (3) the amount of grant money received by local jurisdictions to compensate for lost recycled material revenue.

In 2014, Senate Bill 394 would have established a 5 cent beverage container deposit and a Statewide Container Recycling Refund Program within MDE. In addition, the bill would have established a Container Recycling Refund Program fund administered by the Comptroller to be used for the payment of refunds and handling fees. Senate Bill 684 and House Bill 982 of 2015 would have established a 5 cent beverage container deposit and a Maryland Redeemable Beverage Container Recycling Refund and Litter Reduction Program administered by a private organization of bottlers and distributors. Senate Bill 367 and House Bill 862 of 2016 were very similar to the bills in 2015, except that the program would have been administered by MES.

[20] According to the Product Stewardship Institute, "extended producer responsibility" is a mandatory type of product stewardship that includes, at a minimum, the requirement that the producer's responsibility for its product extends to post-consumer management of that product and its packaging. Extended producer responsibility shifts the financial and/or physical responsibility for managing products at end of life to the producers of those products and away from local governments.

Plastic Bags

According to the Zero Waste Plan, plastic bags have a disproportionately high environmental impact relative to their small fraction of the waste stream. Despite the fact that all plastic bags, sacks, and wraps generated in 2011 constituted only 1.5% of the total U.S. waste stream, they are significant component of litter and are easily blown into storm drains and waterways. As such, adoption of a carryout bag reduction and recycling law is an objective of the Zero Waste Plan.

Legislation to address plastic bag waste has generally takes one of three forms: (1) mandatory take-back programs; (2) fees; and (3) bans. In Maryland, this legislation has generally taken the form of either a fee or a ban structure, or some hybrid between these two options. Customers are either required to pay for each plastic bag that they receive, or stores are prohibited from providing plastic bags at all.

For example, in 2014, Senate Bill 707 and House Bill 718 would have established a fee structure at the county level, allowing a county to impose a fee on a store for the use of disposable carryout bags as part of the sale of products. If a county imposed such a fee, a store in that county must charge a 5-cent fee per bag provided to the customer. Stores retained 1 cent of every 5-cent fee collected, or 2 cents if the store had a "customer bag credit program." Stores were required to remit any fee money not retained to the county.

In 2015, Senate Bill 620 and House Bill 551 would have established a hybrid fee and ban structure by prohibiting stores from distributing disposable plastic bags. The bills specified that stores were allowed to distribute paper bags for a fee of 10 cents and could retain 5 cents of every 10-cent fee collected, or 7 cents if the store has a "customer bag credit program." Paper bag fees not retained by the store must be remitted to the Comptroller.

In 2016, Senate Bill 57 and House Bill 31 prohibited a store from distributing plastic disposable carryout bags free of charge. A store may provide customers with a disposable paper bag but must charge a fee of 10 cents per bag. A store may retain 5 cents of every 10-cent paper bag fee collected, or 7 cents if the store has a "customer bag credit program." A store must remit any paper bag fee revenue not retained to the Comptroller, to be used for specified purposes.

Biological Treatment of Waste

The Zero Waste Plan anticipates that anaerobic digestion, along with composting, will contribute a large part to the recycling rate goals for food scraps and yard trimmings. However, legislation to advance both anaerobic digestion and composting failed during the 2016 legislative session.

Anaerobic Digestion

Anaerobic digestion, which is the controlled decomposition of organic materials in the absence of oxygen, produces biogas, which is composed primarily of methane and carbon dioxide. MDE advises that because of its methane content, biogas can be used to generate heat and electricity and it can also be compressed for use as vehicle fuel or cleaned to natural gas quality. A residual material referred to as digestate is also produced and can be used as a soil amendment, fertilizer, or animal bedding.

According to MDE, anaerobic digestion is primarily used for the treatment of wastewater and sewage sludge at wastewater treatment plants, as well as for the processing of liquid manure at dairy farms. More recently, interest in anaerobic digestion for other waste streams has increased (such as food scraps, food processing residuals, yard waste, mixed municipal solid waste, and poultry manure and bedding). While anaerobic digestion is not yet prevalent in Maryland, MDE advises that commercial-scale projects exist or are underway in several other states. In response to the increasing interest in anaerobic digestion, MDE further advises that a number of states have begun to revise their regulations to specifically address anaerobic digestion.

Outside of the treatment of wastewater and sewage sludge at wastewater treatment plants, Maryland law is silent on the regulation of anaerobic digestion and anaerobic digestion facilities. MDE reports that this creates confusion for the operation of existing facilities and the establishment of new facilities in Maryland.

To address these concerns, House Bill 61 of 2016 (MDE departmental bill), would have required MDE, among other things, to adopt regulations governing the permitting and operation of anaerobic digestion facilities. These regulations were authorized to establish (1) conditions under which a person may construct and operate an anaerobic digestion facility; (2) a tiered system of permits or approvals for anaerobic digestion facilities; (3) design and operational conditions to protect public health and the environment and to minimize nuisances; (4) exceptions to any requirement to obtain an anaerobic digestion facility permit or approval; (5) exemptions for certain anaerobically digested organic materials from being designated as solid wastes; and (6) any other provisions MDE deems necessary to implement the bill's provisions related to anaerobic digestion. A person may operate an anaerobic digestion facility in the State only in accordance with the bill's provisions and any regulation, order, or permit issued pursuant to the bill's provisions. Finally, the bill would have exempted an anaerobic digestion facility that is located on a farm from any requirement to obtain a permit or approval under the regulations if the facility complies with specified federal standards.

Composting

Composting is the biological decomposition of organic matter under controlled thermophilic aerobic conditions (growing best in a warm environment). Maryland law provides that all yard waste collected separately from other solid waste may be transported to a composting facility. However, an owner or operator of a refuse disposal system may not accept truckloads of

separately collected yard waste for final disposal unless the owner or operator provides for the composting or mulching of the yard waste.

Composting Study: In 2011, the General Assembly passed Chapter 363, which directed MDE, in consultation with MES and the Maryland Department of Agriculture (MDA) to:

- study composting in the State, including laws and regulations governing composting by individuals and composting businesses;

- develop recommendations on how to promote composting in the State, including any necessary programmatic, legislative, or regulatory changes; and

- report findings and recommendations to the General Assembly.

To conduct the study required under the Act, MDE convened a Composting Workgroup that included representatives from MES, MDA, the composting industry, local governments, and other stakeholders. The workgroup identified obstacles to increasing composting in Maryland, studied current State law and regulations regarding composting, and heard presentations from regulators in other states. The workgroup's final report included several recommendations, including passing legislation to authorize MDE to adopt regulations governing the design and operation of composting facilities, streamlining the permitting application process for composting facilities, encouraging State and local agencies to explore and encourage composting, and exempting specified types of composting from State regulation and permitting.

Composting Regulations: As a result of the workgroup's recommendations, Chapter 686 of required MDE to adopt regulations governing the permitting and operation of composting facilities and prohibiting a person from operating a composting facility that is not in accordance with the regulations or any permit or order issued under the composting laws in Title 9 of the Environment Article. The bill altered several definitions to treat compost and composting separately from the regulation of solid waste. Finally, the bill provided for the enforcement of State composting laws and regulations through existing enforcement provisions in the water pollution control subtitle of the Environment Article.

Use of Compost and Compost-based Products: Then in 2014, Chapter 430 was enacted to establish the use of compost and compost-based products in highway construction projects in the State as a best management practice for erosion and sediment control, as well as post construction stormwater management. SHA was required to establish a specification for acquiring and using compost and compost-based products for (1) erosion and sediment control practices identified in the most recent Maryland Standards and Specifications for Soil Erosion and Sediment Control developed by MDE and (2) post construction stormwater management practices identified in MDE's most recent *Maryland Stormwater Design Manual*. The State Highway Administration (SHA) must update the specifications as necessary and post the specifications on its website. Finally, the Act established specified study and reporting requirements for SHA.

Yard Waste and Food Residuals: Introduced during the 2016 session, House Bill 743 (failed) would have established the Yard Waste and Food Residuals Diversion and Infrastructure Task Force. Among other things, the task force would have been required to (1) evaluate the current recovery of food waste in the State, opportunities for expansion, and related obstacles; (2) identify organic waste recycling capacity in the State; (3) identify generators of one ton of food waste per week or more, and the estimated total amount of food waste generated from those entities that is expected to be diverted from disposal if adequate capacity exists; (4) identify properties or zones for infrastructure development; (5) study how other states regulate yard waste disposal and food waste recovery; (6) evaluate whether county solid waste management plans should require an organic materials recycling program, and address facility infrastructure needs for organic materials recycling; and (7) study ways to encourage a decentralized and distributed composting infrastructure. Finally, the task force would have been required to recommend specific legislative and other policy initiatives to implement the recommendations in MDE's composting workgroup's final report and the goals of the Zero Waste Plan.

Stewardship Programs

Product stewardship is defined in the Zero Waste Plan as "[T]he act of minimizing health, safety, environmental and social impacts, and maximizing economic benefits of a product and its packaging throughout all lifecycle stages.[21] The producer of the product has the greatest ability to minimize adverse impacts, but other stakeholders, such as suppliers, retailers, and consumers, also play a role." Product stewardship can be voluntary or mandatory. EPR is a type of mandatory product stewardship that puts responsibility on producers to ensure that products are responsibly collected and disposed of or recycled.

One initiative in the Zero Waste Plan is to establish EPR programs for mattresses and other difficult-to-manage materials. To this end, during the 2016 legislative session, bills that would have established paint and mattress recycling programs in the State were introduced.

Paint Stewardship

In Maryland, Senate Bill 201 and House Bill 332 of 2016 (failed), would have required a producer of architectural paint sold at retail in the State, or a representative organization acting on behalf of a producer, to establish a plan for a Paint Stewardship Program in the State. MDE would have been in charge of program approval and oversight. Assessments on paint sold in the State were intended to cover program costs. By October 1, 2017, a producer or retailer would be prohibited from selling a brand of architectural paint unless the producer or its representative is implementing an approved paint stewardship program.

[21] The Product Stewardship Institute (PSI), defines "product stewardship" as a voluntary or mandatory act to minimize the health, safety, environmental, and social impacts, and to maximize economic benefits of a product and its packaging throughout all lifecycle stages. PSI notes that the producer of the product has the greatest ability to minimize adverse impacts, but other stakeholders, such as suppliers, retailers, and consumers, also play a role.

The legislation was similar to legislation passed in other states with paint stewardship programs. Eight states and the District of Columbia have passed paint stewardship legislation (California, Colorado, Connecticut, Maine, Minnesota, Oregon, Rhode Island, and Vermont) and all of those states (except the District of Columbia) are currently administering stewardship programs. In the states that have a paint stewardship program in place, producers fulfill their obligations through a program plan submitted and implemented by PaintCare, a nonprofit representative organization.[22] **Exhibit 3.1** lists the paint stewardship assessment in all states.

Exhibit 3.1
Paint Stewardship Assessments

Container Size	Stewardship Assessment (per container sold)
½ pint or smaller	$0.00
½ pint to less than 1 gallon	0.35
1 gallon	0.75
Larger than 1 gallon	1.60

Source: Maryland Department of the Environment; Department of Legislative Services

Mattress Stewardship

Mattresses pose practical challenges inherent to end-of-life management because they are bulky and not easily compacted, making transport and disposal inefficient. In addition, while mattresses are recyclable, the prevailing method of separating steel, foam, wood, and cotton involves a labor-intensive manual process.

House Bill 1117 of 2016 (failed) would have required producers of mattresses sold at retail in the State, or a representative organization acting on behalf of the producers, to establish a plan for a mattress stewardship program in the State. MDE would have been in charge of program approval and oversight. Assessments on mattresses sold in the State were intended to cover program costs. By October 1, 2017, a producer or retailer would be prohibited from selling a brand of mattress unless the producer or its representative is implementing an approved mattress stewardship program. The legislation was similar to legislation passed in other states with mattress stewardship programs.

In 2013, California, Connecticut, and Rhode Island passed the first mattress EPR programs, which mandate manufacturer-developed recycling plans along with a per unit fee on the retail sale

[22] PaintCare has information available online for each of the participating states, and the District of Columbia, http://www.paintcare.org/paintcare-states/.

of each mattress. In these states, producers fulfill their obligations through a program plan submitted and implemented by the Mattress Recycling Council (MRC), a nonprofit organization established by the mattress industry to develop and operate mattress recycling programs in those three states.[23] According to its website, MRC contracts with third parties for the collection and recycling of discarded mattresses. These activities are funded through the recycling fee collected on the sale of mattresses and box springs to consumers. The mattress stewardship assessment in those states is shown in **Exhibit 3.2**.

Exhibit 3.2
Mattress Stewardship Assessments

State	Current Status of Program	Stewardship Assessment (per unit)
CT	Program began May 1, 2015	$9
CA	Collection of the assessment began December 30, 2015; revised plan approved January 31, 2016	11
RI	Revised plan approved in January 2016; program to start May 1, 2016	10

Source: Maryland Department of the Environment; Department of Legislative Services

Resource Recovery Parks

A resource recovery park, which is a new development in recycling, broadly refers to the co-location of reuse, recycling, compost processing, manufacturing, and retail businesses in a central facility. It is a place where the public can bring all wastes and recoverable materials to a single facility. Resource recovery parks may allow for greater capture, reuse, and recycling of waste materials. According to the California Department of Resources Recycling and Recovery, a resource recovery park helps participating businesses by matching one company to the resource needs of another and should allow for many small operators.

Senate Bill 105 of 2016 (failed) would have authorized NMWDA to fund and use resource recovery parks by expanding the definition of "project" to include a "resource recovery park." Under the bill, NMWDA would have been authorized to acquire, construct, reconstruct, rehabilitate, improve, maintain, equip, lease, and operate a resource recovery park. NMWDA would have been required, to the extent determined practicable by the authority board or the

[23] Mattress Recycling Council, http://mattressrecyclingcouncil.org/.

appropriate county, to use the "zero waste hierarchy" defined in the bill when taking an authorized action regarding a resource recovery park under the bill.[24]

Innovative Local Recycling Initiatives

Local governments are also developing their own initiatives to expand recycling within their jurisdictions. This section provides examples of innovative recycling initiatives in Anne Arundel, Prince George's, and Montgomery counties.

Clothing and Textiles Reuse and Recycling in Anne Arundel County

Anne Arundel County began a textile recycling program in January 2016. Through this program, residents can drop off textiles either for reuse or for recycling. Residents must separate items into those that are still useable and those that are worn out or unusable (torn, stained, or unmatched shoes/socks). The program accepts a wide range of textiles from bedding to shoes to Halloween costumes. The county accepts unusable textile material curbside, and both unusable and useable textile material at recycling centers. Textiles and clothing are categorizes as waste under the Maryland Recycling Act (MRA) waste. Thus, reducing the amount of clothing disposed of in the county counts toward the county's requirement to increase recycling under the MRA.

Leafgro® and Leafgro Gold® in Prince George's and Montgomery Counties

MES operates composting at the Prince George's County Organic Composting Facility in Upper Marlboro in Prince George's County, and the Montgomery County Yard Trim Composting Facility,[25] turning yard waste into a soil amendment product, Leafgro. Both Prince George's and Montgomery counties offer weekly curbside collection of leaves, grass, and brush. These materials are collected, composted, and turned into Leafgro through a windrow process that takes approximately 9 to 12 months to complete. Leafgro is sold both bagged and in bulk.

Additionally, in 2013, Prince George's County piloted a food scrap composting program using Gore Cover technology at the Prince George's County Organic Composting Facility.[26] Gore Cover Technology is an in-vessel aerated pile system with oxygen and temperature monitoring devices. The system can process a greater volume of yard trim and also food scraps on a smaller footprint area to create a finished compost product, called Leafgro Gold, within 30 days. Feedstock comes from a number of residential, commercial, and institutional sectors

[24] The zero waste hierarchy can be found at http://mgaleg.maryland.gov/2016RS/bills/sb/sb0105T.pdf.

[25] Prince George's County waste collection information, http://www.princegeorgescountymd.gov/588/Collections. Montgomery County yard waste collection information, http://www.montgomerycountymd.gov/sws/yardtrim/.

[26] Prince George's County Yard and Food Waste Composting Facility, http://www.princegeorgescountymd.gov/583/Yard-Waste-Composting-Facility.

including the University of Maryland. The program is now permanent and is being expanded to double its output. MES operates the program and markets the final product through a contract with the county.

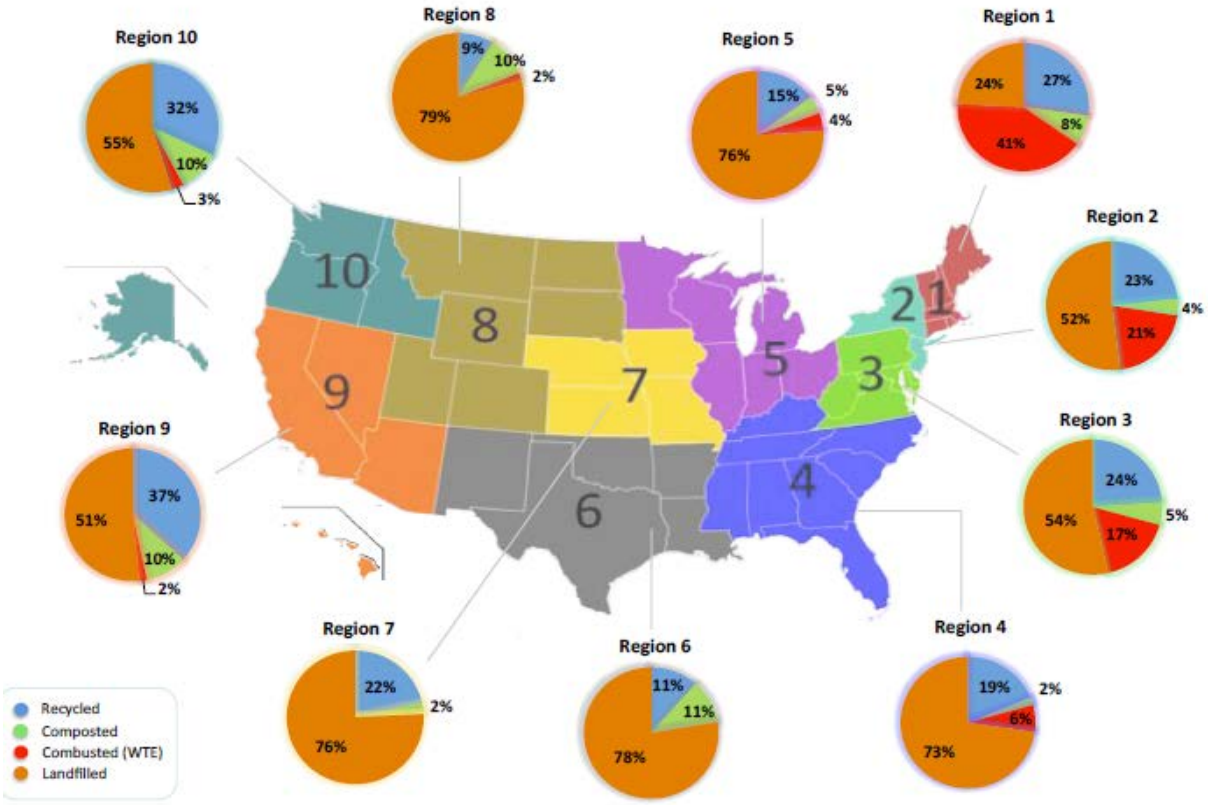
Chapter 4. What Are Other States Doing?

National Survey

In 2014, the Columbia University Earth Engineering Center released its report *Generation and Disposition of Municipal Solid Waste (MSW) in the United States – A National Survey*. The Columbia University report compiled waste management data from 2011 to explore national trends. Overall, the survey results showed that the United States generated 389 million tons of municipal solid waste in 2011. Of the waste generated in 2011, 29.0% was recycled or composted, 7.6% was sent to waste-to-energy facilities, and 63.5% was landfilled. In comparison, the survey determined that Maryland generated 6.16 million tons of waste and recycled 25.5%, composted 13.7%, combusted 22.6%, and landfilled 38.2%. **Appendix 1** shows how municipal solid waste was managed by the states in 2011.

The Columbia University report also highlights key characteristics of waste management among the 10 U.S. Environmental Protection Agency (EPA) regions. As shown in **Exhibit 4.1**, combustion with energy recovery is most prevalent in the East Coast (Regions 1 through 4), with Region 1 having the highest proportion of municipal solid waste disposed by waste-to-energy; the Midwestern Regions (Regions 5 through 8) have the highest landfilling rates and the lowest recycling rates; regions along the West and East coasts have the highest recycling rates; and composting activity is highest in Region 6.

Exhibit 4.1
Recycling, Composting, Combusting, and Landfilling Rates by EPA Regions



EPA: U.S. Environmental Protection Agency

Source: Columbia University Earth Engineering Center report *Generation and Disposition of Municipal Solid Waste in the United States—A National Survey*

State and Local Programs

Although the characteristics of waste management vary among the states, as do the methods by which waste management activities are reported, many states follow a similar framework that focuses on waste prevention, recycling, composting, and disposal. In addition, many states have adopted statewide solid waste management plans and policies to guide waste management activities, which are often implemented by local governments. To provide a sample of the various types of programs, key aspects of several state and local programs are discussed on the following pages.

Virginia

Virginia's waste management policy is guided by the Virginia Waste Management Act, which authorizes the Virginia Waste Management Board, a board comprised of Virginia citizens appointed by the Governor, to adopt waste management-related regulations. The Virginia Department of Environmental Quality (VDEQ) administers the policies and regulations established by the board. The policy of the board is to promote the development of comprehensive waste management programs that incorporate a hierarchy of waste management, consisting of, from top to bottom, source reduction, reuse, recycling, resource recovery (waste-to-energy), incineration, and landfilling. Virginia's waste management hierarchy is similar to EPA's hierarchy, as shown in **Exhibit 4.2**, which ranks the various waste management strategies from most to least environmentally preferred.

Exhibit 4.2
U.S. Environmental Protection Agency's Waste Management Hierarchy

Source: U.S. Environmental Protection Agency

Similar to Maryland, permitted facilities in Virginia that treat, store, or dispose of solid waste are required to report to VDEQ on the amount of solid waste managed by the facility, the amount of waste mined (excavation of previously landfilled materials), the method by which the waste was managed, the jurisdiction where the waste originated, if known, and the facility's remaining capacity. According to VDEQ, in 2015, permitted facilities managed approximately

20.7 million tons of solid waste. Approximately 5.4 million tons of solid waste managed by permitted facilities originated in other jurisdictions. Of the solid waste attributed to out-of-state sources, 45.40%, or approximately 2.4 million tons, came from Maryland. With respect to the method by which solid waste was managed by permitted facilities, 73.38%, or approximately 12.7 million tons, were landfilled on-site; 11.71%, or approximately 2.0 million tons, were incinerated on-site; and the remaining waste was managed by other means. Although permitted facilities provide data on recycling (more than 10.0% of the waste managed by permitted facilities in 2015 was recycled, mulched, or composted), most recycling in Virginia occurs at facilities other than permitted waste management facilities.

Recycling programs in Virginia are implemented at the local level and include a variety of collection systems, including drop-off containers, manned or un-manned convenience centers, and curbside collection programs. Under Virginia law, a solid waste planning unit (SWPU), which can be a city, county, town, or designated region, with a population greater than 100,000, generally must achieve and maintain a 25.0% annual recycling rate, subject to certain exceptions. A SWPU with a population greater than 100,000 must report to VDEQ annually on its recycling activities. In 2015, SWPUs with a population greater than 100,000 exceeded the minimum recycling rate with an overall recycling rate of 44.2%. As shown in **Exhibit 4.3**, a variety of materials were recycled by SWPUs in 2015, with an overall total of 2.7 million tons of materials recycled.

Exhibit 4.3
Solid Waste Material Recycled by SWPUs in Virginia
Calendar 2015

Material	Tons Recycled
Paper	758,223
Metal	405,521
Plastic	21,477
Glass	12,247
Commingled	530,711
Yard Waste	455,890
Waste Wood	258,970
Textiles	21,978
Waste Tires	33,270
Used Oil	30,063
Used Oil Filters	2,365
Used Antifreeze	2,988
Batteries	11,291
Electronics	7,522
Inoperative Motor Vehicles	309
Other	103,072
Total	**2,655,897**

SWPU: solid waste planning unit

Source: Virginia Department of Environmental Quality

Virginia has implemented additional initiatives to promote recycling activities in the state, including a recycling equipment tax credit, waste tire end-user reimbursements[27], noncompetitive grants to assist local jurisdictions in meeting recycling rate targets, and the establishment of the Virginia Litter Control and Recycling Fund Advisory Board, which advises VDEQ in grant-making decisions. In its most recent recycling report, VDEQ highlighted regional efforts to enhance recycling activities, as well as efforts to gather more information on recycling activities not currently subjected to reporting requirements. Among those efforts include:

- **City of Richmond:** In July 2015, the city of Richmond distributed 95-gallon recycling carts throughout the city. According to VDEQ, Richmond experienced a 50% increase in waste diversion, collection efficiencies, and a reduced carbon footprint as a result of the initiative.

- **City of Alexandria:** The city of Alexandria recently conducted a pilot program to collect food waste curbside. Although the pilot program has ended, Alexandria has collected feedback from participants and analyzed the costs and benefits of the program. Alexandria's findings are expected to be announced by the end of 2016.

- **Central Virginia Waste Management Authority:** The authority recently added items eligible for its curbside and drop-off recycling programs, including plastics #1 through #7 (bottles, containers, caps, and lids) and waxy coated cartons (milk, juice, juice boxes, soup, wine, cream, egg substitutes, and cat food boxes).

- **Electronics Recycling:** Electronic recycling rates are not included in Virginia's recycling rates. However, computer manufacturers are required to report to VDEQ the amount of electronics recovered through their recycling networks. In 2015, computer manufacturers reported 2.2 million pounds, or 1,109 tons, of electronics recovered in Virginia.

- **Private-sector Reporting:** In 2015, both Wal-Mart and Target voluntarily submitted recycling data to VDEQ. According to VDEQ, Wal-Mart requested to submit to VDEQ its Virginia-based recycling data for publication on VDEQ's website after receiving requests for data from local jurisdictions in the state. Target soon followed suit by submitting its recycling data to VDEQ.

Delaware

The Delaware Solid Waste Authority (DSWA), which was created by the Delaware General Assembly in 1975, is responsible for solid waste management in Delaware. Its

[27] In 1994, Virginia established its End User Reimbursement Program, which makes direct payments to beneficial end users of Virginia-generated waste tire material. Types of end uses eligible for reimbursement under the program include tire-derived fuel, landfill drainage media, landfill trenches and cover, septic drain fields, and colored mulch. The program was created to strengthen the markets for Virginia-derived waste tire material.

mission is to define, develop, and implement cost-effective plans and programs for solid waste management which best serve the citizens of Delaware and protect the public health and environment. Most of the solid waste disposed of in Delaware goes to one of three landfills owned and operated by DSWA. Solid waste collection activities are primarily conducted by private businesses and local governments and are subject to DSWA licensing requirements.

DSWA's most recent solid waste management plan incorporates zero waste strategies to maximize the recycling and diversion of materials from landfill disposal. The state's Universal Recycling Law, enacted in 2010, established a 50.0% municipal solid waste recycling diversion goal by 2015 and a 60.0% goal by 2020. As shown in **Exhibit 4.4**, Delaware's recycling diversion rate in 2014 was 41.8%, far below the 2015 target. Although Delaware is likely to fall short of its 2015 goal, Exhibit 4.4 shows that the state's recycling diversion rate has increased over the last decade. Increases experienced since 2010 are largely attributed to the implementation of the state's Universal Recycling Law. The law is fully implemented and prohibits DSWA from providing curbside recycling services, including yard waste collection, and instead requires waste haulers to provide single-stream recycling collection to all single- and multi-family residential customers and most bars and restaurants. The commercial sector must also actively participate in a comprehensive recycling program.

Exhibit 4.4
Delaware Recycling Diversion Rates
2006-2014
(Measured in Tons)

	2006	2007	2008	2009	2010	2011	2012	2013
Diverted Recyclables	248,410	377,066	318,032	323,637	359,147	401,883	405,953	450,499
Landfilled Municipal Solid Waste	823,479	794,984	741,143	668,353	706,368	672,761	607,539	623,463
Total	1,071,889	1,172,050	1,059,175	991,990	1,065,515	1,074,644	1,013,492	1,073,962
Diversion Rate	23.2%	28.9%	30.0%	32.6%	33.7%	37.4%	40.1%	41.9%

Source: Delaware Recycling Public Advisory Council; Delaware Solid Waste Authority

Vermont

According to Vermont's most recent Materials Management Plan (formally referred to as the Solid Waste Management Plan), in recent years, the state's per capita solid waste generation

rate was more than 5 pounds per day, and the state's recycling and reuse rate had stagnated in the mid 30% range. In response to these figures, Vermont recently adopted a "sustainable materials strategy," which focuses on using materials throughout the entire lifecycle of a product or material with the intent of preventing overall waste, increasing reusability, and increasing recycling and organics diversion. Vermont has identified several benefits to adopting a sustainable materials strategy, including promoting economic activity and greenhouse gas emissions reductions. A key component to achieving Vermont's strategy is the Universal Recycling of Solid Waste law, which was adopted in 2012 to improve the capture and diversion rates of valuable resources within the state.

The Universal Recycling of Solid Waste law requires recyclable materials, leaf and yard debris, clean wood waste, and food scraps to be diverted from landfills. Additionally, the law seeks to provide increased recycling choices and convenience to residents and businesses. Finally, implementation of the law is phased-in to allow time to establish collection services and processing facilities for managing mandated recyclables, leaf and yard debris, and food scraps. A more detailed summary of the law is as follows.

- **Solid Waste Disposal Ban:** As of July 1, 2015, specified recyclables, including, among other things, aluminum and steel cans, glass bottles and jars, corrugated cardboard, and paper may not be disposed in a landfill. As of July 1, 2016, leaf and yard debris and clean wood waste may not be disposed in a landfill. All food scraps must be diverted from landfills by 2020 with diversions being phased-in over a period of six years, beginning July 1, 2014.

- **Parallel Collection Requirements at Facilities:** Facility owners that offer trash collection must also offer collection of recyclables by July 1, 2014, leaf and yard debris by July 1, 2015, and food scraps by July 1, 2017. Facilities are prohibited from charging a separate fee for the collection of residential recyclables, but may charge commercial haulers for collection of recyclables. However, the costs of collecting recyclables from residents may be included in trash collection fees. Additionally, facilities may charge a fee for the collection of leaf and yard debris and food scraps.

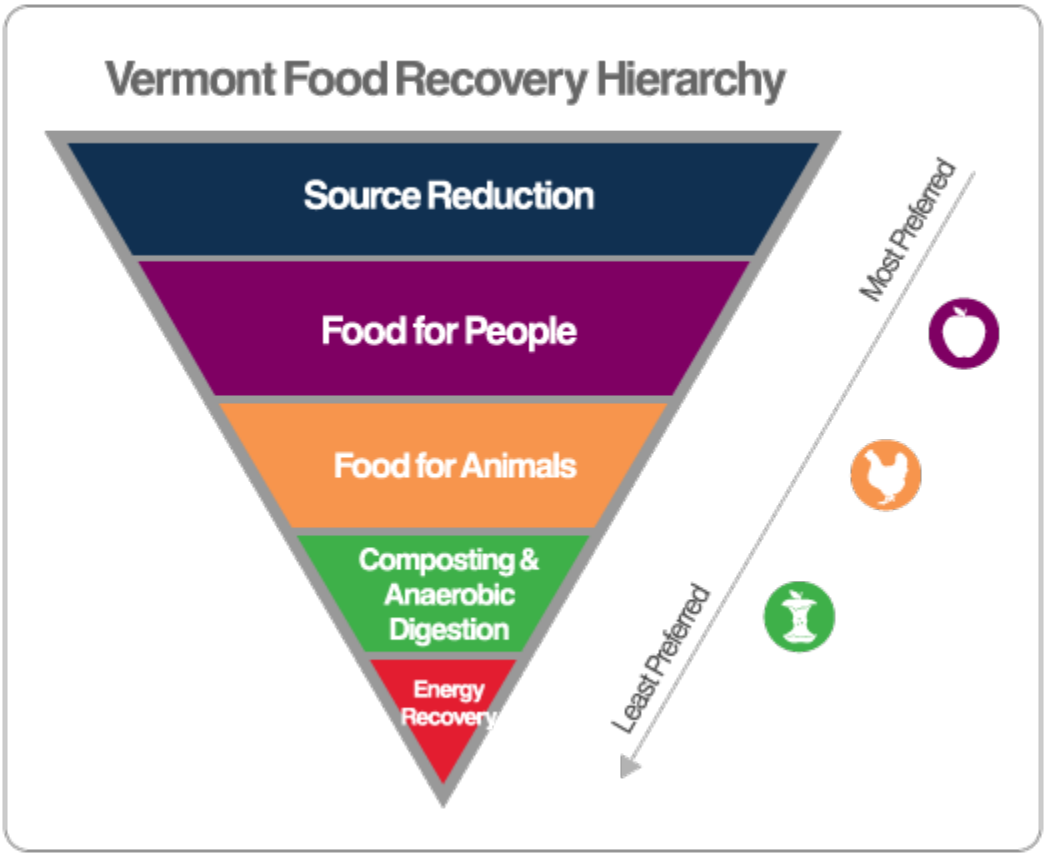
- **Parallel Collection Requirements at Curbside:** Haulers that offer services for managing trash must also offer services for managing recyclables by July 1, 2015, leaf and yard debris by July 1, 2016, and food scraps by July 1, 2017. Haulers are prohibited from charging a separate fee for the collection of residential recyclables but may include the charge in trash collection fees. Additionally, haulers may charge a fee for the collection of leaf and yard debris and food scraps.

- **Food Recovery Hierarchy:** As shown in **Exhibit 4.5**, the law establishes the following food recovery hierarchy: (1) reduction at the source; (2) rescuing quality food for people; (3) diversion for agricultural uses, including as food for animals; (4) composting, nutrient management, and anaerobic digestion; and (5) energy recovery.

- **Pay-as-you-throw:** Under the law, municipalities are required to implement variable rate pricing (also known as pay-as-you-throw) to provide incentives to residential customers to reduce waste.

- **Additional Recycling Options:** The law provides more recycling options by requiring recycling containers to be located in public buildings and publicly owned or controlled land wherever trash cans are located, subject to exceptions.

Exhibit 4.5



Source: Vermont Department of Environmental Conservation

California

In 2011, the California legislature updated the state's approach to solid waste management by establishing a goal that no less than 75% of solid waste managed by the state be source reduced, recycled, or composted by 2020 (75% goal). The framework for California to achieve the 75%

goal focuses on five priority strategies: (1) moving organics out of the landfill; (2) expanding the recycling/manufacturing infrastructure; (3) exploring new approaches for state and local funding of sustainable waste programs; (4) promoting state procurement of post-consumer recycled content products; and (5) promoting extended producer responsibility. In addition to the five priority strategies, California is also focusing on source reduction, commercial recycling, and various products, including packaging, waste tires, e-waste, and used oil.

Extended producer responsibility, as described in Chapter 3 of this report, is one strategy used by California that has gained popularity as a waste reduction tool in a variety of states. California has several programs and initiatives that are based on producer responsibility principles, including, among other things, programs and initiatives to manage carpet, fluorescent lights, computers and televisions, paint, and mattresses.

California has yet to reach its 75% goal. As shown on **Exhibit 4.6**, between 2010 and 2014, California's recycling rate was approximately 50%, and in 2015 it fell to 47%. In the state's most recent recycling report, it is estimated that California will have to recycle at least half of the solid waste that is currently disposed in order to meet the 75% goal. This corresponds to approximately 22 million tons of additional material that would need to be recycled in 2020 beyond current recycling amounts.

Exhibit 4.6
California's Recent Recycling Rates and 2020 Goal

Year	Recycling Rate	Statewide Recycling Goal
2010	49%	-
2011	49%	-
2012	50%	-
2013	50%	-
2014	50%	-
2015	47%	-
2020	-	75%

Source: California Department of Resources Recycling and Recovery

San Francisco

In an effort to conserve valuable resources, reduce environmental impacts, including impacts from climate change and pollution, and create green jobs in the city and county, San Francisco set a 75% landfill diversion goal by 2010 and zero waste goal by 2020. According to the San Francisco Department of the Environment, San Francisco exceeded its 75% diversion

goal in 2010 and has implemented a variety of policies to assist in meeting its goal for zero waste. Among those policies include:

- **Mandatory Recycling and Composting Ordinance:** San Francisco residents and businesses must source separate waste into recyclables, compostables, and trash, and place each type of waste in a separate container designated for disposal of that type of waste. Mixing of recyclables, compostables, or trash is prohibited.

- **Bottle Filling Stations:** In an effort to reduce waste from bottled water, all new construction that provides drinking water fountains must also provide bottle filling stations.

- **Food Service Waste and Packaging:** San Francisco prohibits the sale and use of food service ware and other specified products, including packing materials, made from polystyrene foam and requires the use of food ware that is compostable or recyclable.

- **Bag Reduction:** Any bag provided by a retail establishment must be made of compostable plastic or recyclable paper or must be reusable. Retail establishments are required to charge a minimum fee of 10 cents per bag.

- **Yellow Pages:** San Francisco requires Yellow Pages distributors to get the approval, or opt-in agreement, of San Francisco residents before delivering phone book directories.

Chapter 5. Policy Considerations

While Maryland has a number of initiatives, laws, and regulations in place to guide solid waste management and recycling in the State, continued population growth and diminishing landfill capacity will demand improvements in the way we manage and recycle waste in the future. As a result, the General Assembly may wish to consider the following:

- **Reduce Maryland's Per Capita Waste Generation:** Maryland's per capita solid waste generation in 2014 was 1.1 tons, or 5.98 pounds per person per day, a level significantly higher than the U.S. Environmental Protection Agency's estimated 2013 national rate of 4.4 pounds per person per day.

- **Implement the Zero Waste Plan:** Maryland's Zero Waste Plan established a framework to reduce, reuse, and recycle waste in the State through 2040. While a few initiatives in the plan have been implemented, including the development of composting regulations and the completion of a Waste Sort, most have not.

- **Monitor Results of Waste Sort:** The results of the Waste Sort will help determine the types and quantities of the waste Maryland generates, which will allow the State to target specific materials for increased recycling and other waste diversion or reuse programs. Regularly mandated waste sorts may improve waste data collection going forward.

- **Establish Permits for Recycling and Anaerobic Digestion Facilities:** According to the Maryland Department of the Environment (MDE), there are a number of recycling facilities in the State that are unpermitted, despite the fact that they may be managing substantial amounts of solid waste. Requiring permits for recycling facilities that handle more than a negligible amount of waste will allow for additional recycling data collection and inform efforts to improve the quality of materials sent for recycling. Similarly, Maryland law is silent on the regulation of anaerobic digestion and anaerobic digestion facilities, which may create confusion for the operation of existing facilities and the establishment of new facilities in the State.

- **Increase Maryland Recycling Act Mandatory Recycling Rates:** When Maryland increased its mandatory recycling rates under the Maryland Recycling Act in 2012, all but two counties were already meeting the new, more stringent recycling rate. In addition, the State met its new recycling rate (30%) by 2014.

- **Evaluate Waste Imports and Exports:** Should Maryland import solid waste in light of diminishing capacity in landfills in the State? Is exporting waste a strategy the State will employ to reduce capacity pressure on its landfills in the future, and is the ultimate disposition of exported waste in accord with Maryland's goals under the Zero Waste Plan?

- **Fill Gaps in Data Reporting:** According to MDE, not all types of waste are reported to MDE, including some commercial and industrial waste, agricultural waste, and coal combustion byproducts. Requiring additional or all waste to be reported to MDE will provide the State with a more complete view of the State's total waste landscape, which may improve waste management.

- **Explore Resource Recovery Parks:** A resource recovery park involves the co-location of reuse, recycling, compost processing, manufacturing, and retail businesses in a central facility. A relatively new development in waste management, they may provide the State with opportunities to reduce pressure on landfills while also encouraging economic development.

- **Learn From Other States:** Look to other states for innovative solid waste management and recycling practices. For example, in Virginia, both Wal-Mart and Target submit recycling data to the Virginia Department of Environmental Quality. Vermont bans several recyclables, including aluminum cans, glass bottles, and corrugated cardboard from its landfills.

- **Encourage Extended Producer Responsibility (EPR) and Pay-as-you-throw:** Several states have already embraced EPR programs that were initiated by the producer/manufacturer for specific items, including mattresses and paint. Further, variable rate pricing for waste (also called "pay-as-you-throw") requirements incentivize people to reduce their own waste.

Appendix 1

Columbia University Earth Engineering Survey Results

Municipal Solid Waste Recycled, Composted, Combusted, and Landfilled by State 2011

Table 4. Percent MSW Recycled, Composted, Combusted and Landfilled in each State in 2011

State	Estimated Total MSW Generation	% Recycled	% Composted	% Combusted	% Landfilled
Alabama	5,395,280	9.0	n/a	3.3	87.7
Alaska*	677,393	4.5	[1]	0.0	95.5
Arizona	7,057,796	5.4	0.9	0.0	93.6
Arkansas	5,766,850	41.7	1.6	0.0	56.8
California	66,299,346	41.8	11.5	1.3	45.3
Colorado	8,062,492	21.7	2.2	0.0	76.1
Connecticut	3,208,768	16.6	8.5	67.1	7.7
Delaware	1,022,328	12.7	19.8	0.0	67.6
District of Columbia^	471,430	4.3	1.2	46.0	48.5
Florida	27,040,919	27.2	n/a	21.4	51.3
Georgia	10,600,921	6.5	0.4	0.0	93.1
Hawaii*	3,884,163	15.8	7.0	14.1	63.1
Idaho	1,824,778	8.6	n/a	0.0	91.4
Illinois	13,629,998	7.3	3.6	0.0	89.0
Indiana	6,440,739	7.6	5.7	10.9	75.8
Iowa	3,930,863	24.0	6.4	1.0	68.6
Kansas	3,284,855	28.4	2.7	0.0	68.9
Kentucky	6,222,727	26.7	5.9	0.0	67.4
Louisiana*	5,783,868	0.5	10.1	0.0	89.3
Maine	1,412,071	47.7	3.7	33.5	15.1
Maryland	6,156,163	25.5	13.7	22.6	38.2
Massachusetts	7,520,771	28.6	8.8	42.2	20.4
Michigan*	13,780,215	6.0	[1]	7.2	86.7
Minnesota	5,710,304	44.8	3.9	20.1	31.3
Mississippi	2,866,104	4.6	0.2	0.0	95.2
Missouri*	4,933,141	19.6	[1]	0.0	80.4
Montana	1,694,083	14.9	4.4	0.0	80.6
Nebraska	2,552,668	13.1	[1]	0.0	86.9
Nevada	4,046,301	28.4	2.1	0.0	69.4
New Hampshire	1,144,568	40.8	2.1	22.0	35.2
New Jersey	10,861,083	40.0	0.0	19.6	40.4
New Mexico	2,389,434	14.2	2.8	0.0	82.9
New York	17,349,855	12.9	6.7	21.2	59.2
North Carolina	9,137,435	8.7	7.1	0.0	84.3
North Dakota	935,000	9.6	18.2	0.0	72.2
Ohio	12,729,405	19.3	9.0	0.0	71.7
Oklahoma*	4,778,966	3.7	[1]	4.3	92.0
Oregon	3,945,093	36.5	10.3	4.6	48.6
Pennsylvania	14,135,701	31.6	4.8	21.8	41.8
Rhode Island	922,480	7.0	7.0	0.0	86.0
South Carolina*	4,425,431	21.6	4.0	0.0	74.5
South Dakota	864,702	18.2	7.0	0.0	74.8
Tennessee	7,642,442	20.0	1.0	0.0	79.0
Texas	31,101,890	8.9	14.8	0.0	76.3
Utah	2,535,552	2.2	11.6	5.0	81.2
Vermont	535,425	22.4	6.8	0.0	70.8
Virginia*	15,359,820	18.4	2.6	13.3	65.7
Washington	8,801,350	36.9	13.3	3.1	46.7
West Virginia*	2,157,946	16.0	[1]	0.0	84.0
Wisconsin	5,650,450	14.9	9.7	1.3	74.0
Wyoming	729,335	6.4	10.0	0.0	83.6
Total	**388,959,390**				

* State did not participated in the survey
n/a Data not available
^ Composted, combusted and landfilled wastes from D.C. is not added to the national total to eliminate double counting (D.C outsources MSW for composting, combusting and landfilling)
[1] Composted ton included in the recycled tonnage

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