Ohio Environmental Protection Agency

2020 State Solid Waste Management Plan

Division of Materials and Waste Management
October 2019

Director's Comments

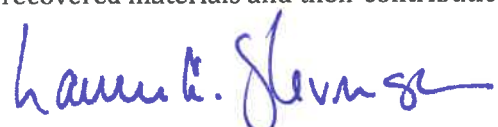
In 1988, Ohio's General Assembly passed House Bill 592 which revolutionized Ohio's outdated solid waste program. Among other accomplishments, this landmark legislation established comprehensive solid waste management regulatory and planning structures to ensure solid waste is managed safely and to reduce Ohio's reliance on landfills to manage waste. The requirements established through House Bill 592 continue to shape Ohio's solid waste management planning and regulatory programs. Even more exciting to me, however, are the great strides we have made as a state to implement programs to divert material away from disposal to value-added uses. I am also impressed by the scope of outreach and education strategies Ohio's many stakeholders are implementing to support recovery efforts throughout the state.

Since adopting the previous state plan, the *2009 State Solid Waste Management Plan*, Ohio achieved several notable solid waste related successes, including:

- In 2017, Ohio achieved a statewide reduction and recycling rate for the residential/commercial sector of a little over 29 percent. Furthermore, 27 of Ohio's solid waste management districts achieved reduction and recycling rates of 25 percent or greater for the residential/commercial sector.
- In 2015, Ohio EPA worked with Emerge Technologies to launch a web-based platform using Re-TRAC to provide an easier, more streamlined approach for entities to submit required solid waste reports. This database allows for better reporting functionality and a more comprehensive way of examining waste management data. Ohio EPA incorporated several reports into Re-TRAC and continues to expand its use by integrating additional reports.
- In 2019, Ohio EPA began an education and outreach effort to combat contamination in the residential recycling stream. This project is a collaboration among many parties, including Ohio EPA, The Recycling Partnership, local communities, and private waste companies. Ohio EPA awarded a grant to The Recycling Partnership to make the project possible. The project consists of education and behavior change components to decrease contamination and increase acceptable materials collected through curbside recycling services. The project will result in a toolkit that other interested communities in Ohio can use to conduct similar efforts.

As a state, Ohio achieved quite a bit since 2009, but there is still more we can do. Each revision of the state plan gives us a chance to re-energize our efforts to reduce, reuse, and recycle waste. This is particularly important given the barriers the recycling industry currently faces. This version of the state plan incorporates strategies for improving and increasing recovery of recyclable materials. It also directs Ohio EPA to focus its market development efforts on recovering the materials manufacturers need for feedstock. We can accomplish this through strong education, outreach, and technical assistance.

I challenge all Ohioans, both citizens and businesses, to reduce how much waste they generate and to increase both the quality and quantity of material recycled. Together, we can continue to make Ohio a leader in managing solid waste in ways that are protective of human health and the environment and capitalize on the value of recovered materials and their contributions to Ohio's circular economy.



Laurie A. Stevenson, Director
Ohio EPA

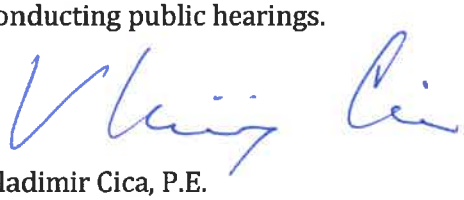
Chief's Comments

In the ten years since Ohio last adopted a state solid waste management plan, much has changed in the recycling industry. Many of these changes are challenging local waste professionals, particularly solid waste management districts and communities, to adopt new strategies for providing recycling services. This revision of the state solid waste management plan provides solid waste management districts with additional flexibility to address some of those challenges. This revision also pushes Ohio EPA and other state agencies to work on solutions to both facilitate the flow of recyclables throughout the state and increase the supply of usable material for Ohio manufacturers. Now more than ever, cooperation among many players in the recycling industry is crucial to ensuring that recycling is successful in Ohio. This state solid waste management plan is one step in facilitating that cooperation.

Preparing Ohio's state solid waste management plan requires many people to devote many hours of work. On behalf of the Division of Materials and Waste Management (DMWM), I would like to thank all the people who contributed to the effort. Special appreciation is extended to the members of the Materials Management Advisory Council (MMAC) who provided their time, attention, and input to make this, the fourth revision of the state plan, a document we can all be proud of.

In addition, there are numerous representatives from Ohio's solid waste management districts and the Organization of Solid Waste Districts of Ohio who provided valuable input and suggestions during the development of this document. I also appreciate the valuable contributions made by DMWM employees to make this effort a success. Ernie Stall and Kevin Zacharyasz, principal authors and researchers of this document put considerable effort and time into this state plan. I also extend my appreciation to Chet Chaney, for providing leadership and direction to make this effort a success, to Jeff Montavon for his topic research, and to Matthew Hittle for his general support.

I also recognize and thank Kelly Jeter and Channon Cohen of DMWM's Scrap Tire Unit for providing important information regarding Ohio's scrap tire program, Annette DeHavilland for her knowledge of the landfill program, and to David Foulkes and Marie Barnett of the Division of Environmental and Financial Assistance for input regarding Ohio EPA's grants and market development. Finally, thank you to Cathryn Allen from Ohio EPA's Public Interest Center for designing the final version of this state solid waste management plan and to Mary McCarron, also from the Public Interest Center, for scheduling and conducting public hearings.



Vladimir Cica, P.E.
Chief, Division of Materials and Waste Management

Forward

On October 16, 2019, the Materials Management Advisory Council considered and duly approved this update of the state solid waste management plan. On November 21, 2019, the director of Ohio EPA (Ohio EPA) adopted this state plan. Before the state plan was approved and adopted, Ohio EPA held public hearings in five locations throughout Ohio. A hearing was held at each of Ohio EPA's five district offices. The locations and dates of those hearings were as follows:

- Tuesday, September 24, 2019
  Ohio EPA's Southwest District Office
  401 E. Fifth St.
  Dayton, Ohio
  (937) 285-6357

- Wednesday, September 25, 2019
  Ohio EPA's Northwest District Office
  347 North Dunbridge Rd.
  Bowling Green, Ohio
  (419) 352-8461

- Monday, September 30, 2019
  Ohio EPA's Southeast District Office
  2195 Front St.
  Logan, Ohio
  (740) 385-8501

- Tuesday, October 1, 2019
  Ohio EPA's Central Office
  50 W. Town Street, Suite 700
  Columbus, Ohio

- Wednesday, October 2, 2019
  Ohio EPA's Northeast District Office
  2110 E. Aurora Rd.
  Twinsburg, Ohio
  (330) 963-1200

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Executive Summary

In 1988, Ohio's General Assembly passed House Bill 592, which dramatically changed Ohio's existing solid waste program. This legislation established a comprehensive planning and regulatory process to ensure that adequate and environmentally sound solid waste management capacity is available to manage the waste Ohio generates. To help preserve that capacity and to recognize the inherent value in waste materials, House Bill 592 also initiated requirements to reduce Ohio's generation of waste and increase the State's efforts to recycle.

To facilitate Ohio's reduction and recycling efforts, Ohio law requires the Ohio Environmental Protection Agency (Ohio EPA), working with the Materials Management Advisory Council (MMAC), to prepare and adopt a state solid waste management plan (state plan). Among other purposes, the state plan establishes Ohio's recycling and reduction goals that guide the programs provided by solid waste management districts (SWMDs). The state plan also establishes recycling and reduction strategies to be implemented at the state government level. These strategies are focused on efforts that Ohio's state agencies can take to enhance recycling and waste reduction efforts within the State.

Ohio has made great strides toward reducing its reliance on landfills and directing resources to other uses. This is reflected in Ohio's municipal solid waste (MSW) reduction and recycling rate which increased from 25.2 percent in 2009 to just over 29 percent in 2017. Further, Ohio has a strong network of curbside and drop-off recycling opportunities that give residents the ability to recycle.

Ohio EPA recently implemented two tools to assist businesses with their waste recovery and reuse efforts. The first is the Ohio Materials Marketplace (OMM), a free, online platform for participants to trade usable wastes. To date, OMM users have diverted a cumulative 3.7 million pounds of material from Ohio's landfills and realized more than $208,000 in savings.

The second tool is a beneficial program which provides mechanisms for using wastes that would otherwise be disposed for value-added applications. These tools complement Ohio EPA's existing technical assistance programs, such as the Agency's compliance and pollution prevention assistance program. That program helps businesses meet their regulatory requirements and minimize waste generation.

Ohio EPA and MMAC monitor the State's progress toward implementing the effective state plan and conditions that affect the recycling industry. If MMAC and Ohio EPA both conclude that circumstances have changed enough to warrant amending the state plan, then they work together to update it.

While reviewing the 2009 State Solid Waste Management Plan (2009 State Plan), the currently effective version, MMAC and Ohio EPA identified several developments that have affected the recycling industry and the sustainability of recycling services (see Chapter 1). MMAC and Ohio EPA considered these developments profound enough to warrant updating the 2009 State Plan.

To address those developments and provide some relief to SWMDs and local communities for rapidly increasing costs of providing services, MMAC and Ohio EPA agreed to refine the existing reduction and recycling goals rather than defining new goals and do that through a partial rather than full-scale update. These refinements give SWMDs additional flexibility to best serve their constituents and achieve the goals of the state plan. Doing a partial update will make this flexibility available to the SWMDs as quickly as possible.

Ohio is committed to waste reduction and recycling and constantly looks for ways to improve those efforts. Ohio faces new challenges due to changes in world markets for recovered materials and the quality of recyclables being collected. These challenges complicate the State's ability to continue its progress. However, the State is committed to developing strategies designed to overcome these challenges. Changes introduced with this state plan are intended to help Ohio overcome these challenges, improve recovery efforts, and support growth of Ohio's economy.

Changes Introduced with This Revision

This update to the state plan makes several changes to the goals that guide programming provided by the SWMDs. These changes include:

- Renumbering goals 5 through 9 from the 2009 State Plan to 6 through 10 to accommodate a new goal.
- Goal 1 - Infrastructure Goal
  - Reducing the percentage of the population a solid waste management district must provide with the opportunity to recycle from 90 percent to 80 percent.

    Reducing the threshold for meeting Goal 1 allows SWMDs to reallocate resources to help bolster successful efforts. Over the past decade, SWMDs communicated that the 90 percent threshold sometimes results in siting drop-off locations in marginal areas. The hope with the revised goal is that recycling programs can be reexamined and strengthened where necessary. The intended result is to balance residents' access to convenient recycling options with the financial sustainability of those options. This is particularly relevant to drop-off recycling locations. Recyclables collected through drop-off recycling locations tend to be contaminated with non-recyclable waste. This increases the costs of processing recyclables and providing those drop-off recycling locations. The change to Goal 1 will allow SWMDs to eliminate some sites that might have financially hindered a district and improve other drop-off locations with a more focused approach.

  - Allowing a SWMD to apply for a waiver from Ohio EPA to provide less than 80 percent of the residential population with opportunities to recycle.

    This provision primarily addresses drop-offs. To receive a waiver, a SWMD would need to demonstrate that a drop-off performs better than a typical drop-off or because of its location, services a larger population than would normally be expected. This change will allow SWMDs to capitalize on locating recycling opportunities where they will provide the greatest service.

- Goal 2 - Waste Reduction and Recycling Rates
  - Replacing the industrial sector objective of reducing and recycling 66 percent of the industrial solid waste generated with Goal 5.

    One of the most chronic limitations is the challenge of simply obtaining data. Each SWMD is required to report to Ohio EPA annually regarding, among other things, the quantities of materials recycled during the previous year within the SWMD. However, the entities that have the data are not required under Ohio's regulations to report to the SWMDs. Consequently, the SWMD has little to no control over the number of entities that respond to a survey or the quality of the data it receives. Often, SWMDs achieve relatively low response rates to surveys and must report incomplete data.

    To alleviate the need for SWMDs to obtain data from industrial generators, this state plan replaces the industrial recycling rate with a new goal (see Goal 5 below) focused on providing programs and services to industrial generators. This will allow SWMDs to reallocate time and money previously devoted to obtaining data to helping industrial generators increase their recycling efforts.

- Goal 5 - Industrial Programs and Services
  - Creating a new goal for SWMDs to incorporate a strategic initiative for the industrial sector into its solid waste management plan. The SWMD must make at least three programs, activities, or services available to industrial generators. The SWMD will select programs from a list provided in the solid waste management plan format issued by Ohio EPA.

    As stated under Goal 2, obtaining data can be extremely difficult and time consuming. This new goal

will focus on providing industrial generators education, outreach, and behavior changing programming with the goal of increasing their recycling efforts.

Chapter 1 — Introduction

This chapter provides the context in which House Bill 592 was developed and adopted as well as the current state of solid waste management in Ohio.

In the mid- to late-1980s, Ohio faced a wide array of significant solid waste management issues. These issues were due in part to the lack of a comprehensive regulatory structure for overseeing solid waste disposal facilities and partly due to the lack of planning for how to manage Ohio's solid waste. The issues included decreasing landfill capacity, increasing amounts of imported waste, environmental degradation from landfill facilities, lack of solid waste management planning, and desire for local control over the flow of solid waste.

Ohio Revised Code (ORC) Section 3734.50, as established by House Bill 592, requires the state plan to:

- Reduce reliance on the use of landfills for management of solid waste;
- Establish objectives for solid waste reduction, recycling, reuse, and minimization and a schedule for implementing those objectives;
- Establish restrictions on the types of solid wastes disposed of by landfilling for which alternative management methods are available (such as yard waste);
- Establish general criteria for the location of solid waste facilities;
- Examine alternative methods for disposal of fly ash and bottom ash resulting from the burning of mixed municipal solid waste;
- Establish a statewide strategy for managing scrap tires;
- Establish a strategy for legislative and administrative actions that can be taken to promote markets for products containing recycling materials; and,
- Establish a program for the proper separation of household hazardous waste (HHW).

The state plan contains chapters devoted to each of the bulleted topics above. House Bill 592 also required all 88 counties in Ohio to form SWMDs either individually or in combination with one or more other counties. As of 2009, Ohio had 52 SWMDs. Each SWMD is required to prepare a solid waste management plan that demonstrates how the SWMD will achieve the goals of the state plan. Each SWMD is further required to obtain local approval of the plan through a ratification process, submit the plan to Ohio EPA for review and approval, and annually review implementation of the plan. SWMDs are required to revise their solid waste management plans on a regular schedule established in the statute.

Chapter 1 also describes the planning process at the local level, changes in waste management practices, solid waste generated and disposed in Ohio, available capacity at and types of landfills for disposing of solid waste, and imports and exports of solid waste.

Chapter 2 — Implementing the 2009 State Solid Waste Management Plan (2009 State Plan)

Since the 2009 State Plan was adopted, all 52 of Ohio's SWMDs either obtained approval for a revised solid waste management plan or were issued an updated solid waste management plan prepared by Ohio EPA. Of those, 42 chose to meet Goal 1 (recycling infrastructure). These 42 SWMDs represent 77 of Ohio's counties. The remaining 10, representing 11 counties, chose to meet Goal 2 (waste reduction and recycling rates).

Even though they have the choice of meeting Goal 1 or Goal 2, a SWMD needs recycling opportunities to achieve its chosen goal. In 2017, SWMDs relied on the following recycling opportunities to meet both goals.

- 249 subscription curbside programs;
- 449 non-subscription curbside programs; and

- 1,212 drop-off locations.

In 2017, Ohio achieved a residential/commercial (R/C) waste reduction and recycling rate of 29.1 percent, the highest rate ever achieved. Further, the state has exceeded the R/C goal of 25 percent every year since first surpassing it in 2009. Ohio continues to make great strides, but there is always room for improvement.

In 2017, individual SWMDs achieved waste reduction and recycling rates that were quite varied as is demonstrated in the following bullet points:

- For the R/C sector, the waste reduction and recycling rates ranged from a low of a little more than three percent to a high of more than 52 percent.
- 27 SWMDs achieved R/C sector waste reduction and recycling rates of 25 percent or greater.
- 35 SWMDs achieved industrial sector waste reduction and recycling rates of 66 percent or better.

Chapter 3 — Goals for Solid Waste Reduction, Recycling, Reuse, and Minimization

This chapter establishes 10 goals designed to further waste reduction and recycling in Ohio. Goals 1 and 2 have always been considered the primary goals for SWMDs. Although encouraged to attempt to achieve both goals, SWMDs are required to demonstrate compliance with either Goal 1 or Goal 2, not both. Apart from Goal 9 which is a voluntary goal, SWMDs are required to meet the remaining goals. As a result, SWMDs are required to demonstrate compliance with a minimum of eight of the 10 goals. The 10 goals are as follows:

Goal 1 — Recycling Infrastructure

The SWMD shall provide its residents and commercial businesses with access to opportunities to recycle solid waste. At a minimum, the SWMD must provide access to recycling opportunities to 80 percent of its residential population in each county and ensure that commercial generators have access to adequate recycling opportunities.

Goal 2 — Waste reduction and recycling rates

The SWMD shall reduce and recycle at least 25 percent of the solid waste generated by the residential/ commercial sector.

Goal 3 — Outreach and Education – Minimum Required Programs

The SWMD shall provide the following required elements:

- A web site;
- A comprehensive resource guide;
- An inventory of available infrastructure; and,
- A speaker or presenter.

Goal 4 — Outreach and Education

The SWMD shall provide education, outreach, marketing, and technical assistance regarding reduction, recycling, composting, reuse, and other alternative waste management methods to identified target audiences using best practices.

Goal 5 — Industrial Programs and Services

The SWMD shall incorporate a strategic initiative for the industrial sector into its solid waste management plan.

Goal 6 — Restricted Solid Wastes, Household Hazardous Waste (HHW) and Electronics

The SWMD shall provide strategies for managing scrap tires, yard waste, lead-acid batteries, HHW, and obsolete/end-of-life electronic devices.

Goal 7 — Economic Incentives

The SWMD shall explore how to incorporate economic incentives into source reduction and recycling programs.

Goal 8 — Measure Greenhouse Gas Reduction

The SWMD will use U.S. EPA's Waste Reduction Model (WARM) (or an equivalent model) to evaluate the impact of recycling programs on reducing greenhouse gas emissions.

Goal 9 — Market Development

The SWMD has the option of providing programs to develop markets for recyclable materials and the use of recycled-content materials.

Goal 10 — Reporting

The SWMD shall report annually to Ohio EPA regarding implementation of the SWMD's solid waste management plan.

State Strategies

To facilitate achieving waste reduction and recycling in Ohio, this state plan establishes the following 10 strategies to be implemented by Ohio's government agencies:

Strategy 1

In collaboration with The Ohio Manufacturers Association, the Ohio Chamber of Commerce and other trade organizations, identify recycling-related programs and services industrial generators need/would like to be offered.

Strategy 2

Ohio EPA will collaborate with The Ohio Manufacturers Association and the Ohio Chamber of Commerce to encourage industrial reuse/recycling from a state level.

Strategy 3

Ohio EPA will evaluate its ability to establish an information clearinghouse for outreach/education resources on the Agency's website.

Strategy 4

Ohio EPA will assist local communities make information about what can/can't be recycled available. In carrying out this strategy, Ohio EPA will focus on using social media.

Strategy 5

Ohio EPA will investigate a procedure to identify new solid wastes, new contaminants, and new recyclable materials that need to be monitored and addressed.

Strategy 6

Ohio EPA will investigate ways of reducing contamination at drop-offs.

Strategy 7

Ohio EPA will include contamination reduction efforts as priorities in the Agency's Recycling and Litter Prevention Grants program.

Strategy 8

Ohio EPA, working with appropriate stakeholders, will investigate the best strategy for providing recycling services to residents in multi-family housing structures. Such a strategy could involve:

- working with property managers, condominium associations, and housing boards to establish and contract for on-site recycling services;
- siting drop-offs in areas with high concentrations of multi-family housing;
- developing a how-to manual for starting a recycling program for multi-family housing; and,
- targeted promotion to residents in multi-family housing about their recycling options.

Strategy 9

Ohio EPA will develop a hierarchy that represents a phased approach for communities to implement recycling programs, services, and education. The first tier of the hierarchy would consist of basics. Each subsequent tier would consist of more advanced activities. The premise is that as a community has experience and resources, it makes continuous improvement by expanding the scope and complexity of available programs.

Strategy 10

Ohio EPA will develop case studies to profile programs for achieving Goal 4. To be profiled, a program must have successfully resulted in changing recycling behavior.

Chapter 4 — Restrictions on the Types of Solid Waste Disposed of in Landfills and Burned in incinerators

Restricting wastes from disposal avoids potential environmental problems by managing high volume, potentially harmful, and difficult to manage wastes through more appropriate options. Restrictions on how certain waste materials can be managed are also a means of preserving landfill capacity. Furthermore, restrictions are a tool for recovering value from waste. Ohio's solid waste regulations mandate the following restrictions:

- **Yard Waste**: Ohio's current yard waste restriction bans source-separated yard waste from being disposed of in solid waste landfill facilities and burned in incinerator facilities.
- **Scrap tires**: Ohio's scrap tire restriction bans all whole and shredded scrap tires from being disposed of in landfill facilities (except for landfills or landfill units specifically designed to accept only scrap tires).
- **Lead-acid batteries**: Ohio law prohibits anyone from commingling a used lead-acid battery with solid waste or disposing of a used lead-acid battery at a solid waste facility.

Ohio EPA does not regulate most solid waste generators or transporters[1]. The Agency regulates where waste is managed and disposed. That means Ohio EPA cannot prevent generators or transporters from putting restricted wastes in general trash. That precludes Ohio EPA's ability to enforce a material restriction. Thus, this revision of the state plan does not recommend new material restrictions. Instead Ohio and the SWMDs will focus on developing alternative strategies for waste streams that can be properly managed through a method other than disposal. Such a focus places a strong emphasis on educating residents regarding alternative management options for specific non-restricted waste streams (such as major appliances, electronic equipment, and used oil).

Chapter 5 — Revised General Criteria for the Location of Solid Waste Facilities

Prior to House Bill 592, Ohio's solid waste regulations provided limited requirements governing the appropriateness of a location for constructing and operating a solid waste facility. Today, Ohio has comprehensive siting criteria which are reviewed every five years in compliance with Ohio's rule review process. From 2009 to 2019, Ohio did not adopt any new siting criteria or revise the existing rules.

While preparing this version of the state plan, Ohio EPA was performing a five-year review of the landfill rules and had issued a draft version of the municipal solid waste landfill rules for interested party comment. If adopted, those rules would change the existing siting criteria from applying to the entire facility boundary to applying to sources of pollution (for example, areas of waste placement, areas of leachate storage) within the facility boundary.

Given the comprehensiveness and regular reviews of Ohio's siting criteria, the state solid waste management plan now plays a minor role in influencing the program. For that reason, this version of the state plan defers to the rule development process for any recommendations to siting criteria.

[1] The scrap tire restriction is an exception because Ohio's law gives Ohio EPA the authority to regulate generators, transporters, and facility owners/operators.

Chapter 6 — Management of Ash Resulting from the Burning of Mixed Municipal Solid Waste

When House Bill 592 was passed, Ohio's solid waste management community anticipated that incinerating solid waste would be an important component of Ohio's overall waste management system. As a result, the General Assembly wanted to foster alternatives to disposal for the resulting ash.

In 2009, there were no operating incinerators burning mixed municipal solid waste. Therefore, managing municipal solid waste combustion ash is not a pressing issue for Ohio. Furthermore, Ohio EPA does not expect incineration to become a significant solid waste management option soon due to the expense of upgrading existing incinerator facilities to meet current air emission standards and the time required to issue a permit to install for a new facility. Consequently, this state plan does not recommend alternative methods for managing municipal solid waste incinerator ash.

Chapter 7 — A Statewide Strategy for Managing Scrap Tires

When House Bill 592 was passed, Ohio lacked a regulatory program to ensure that scrap tires were managed properly. Ohio now has a comprehensive scrap tire management regulatory program that is more than 25 years old. More importantly, Ohio's five-year review requirement provides regular opportunities to make needed changes to the program.

Given the maturity of and regular updates made to Ohio's scrap tire program, the state solid waste management plan now plays a minor role in influencing the program. For that reason, this chapter summarizes recent developments in and plans for the scrap tire program rather than recommend changes to the program.

Ohio EPA was reviewing the scrap tire rules at the time this state plan was prepared. The Agency was proposing the following changes to the rules:

- Re-organize the scrap tire rules into a new program chapter in OAC 3745-580. This re-organization would involve rescinding the existing scrap tire rules in OAC 3745-27 and promulgating new rules in OAC 3745-580. The current 20 scrap tire rules are lengthy and contain multiple sub-level paragraphs. By re-organizing them, the rules can be better organized and spread out more appropriately over an entire chapter of the Administrative Code.
- Require owners of scrap tire facilities that are excluded from licensing and registration/permitting requirements to secure scrap tires in a way that minimizes theft.
- Remove the requirements that mirror Ohio's Fire Code for excluded scrap tire facilities. Ohio Fire Code requirements will remain in the scrap tire rules for the licensed and registered/permitted scrap tire facilities.

One of the primary purposes of the scrap tire program is addressing illegal accumulations of scrap tires through enforcement and cleanup activities. Those efforts are ongoing. To facilitate compliance and reduce illegal dumping of scrap tires, Ohio EPA was developing a scrap tire toolkit. The toolkit is designed to be a resource that Ohio EPA inspectors, health departments, solid waste management districts, and local law enforcement can use to educate and evaluate scrap tire generators' compliance with Ohio's requirements. Ohio EPA planned to pilot and evaluate those tools for effectiveness.

In 2019, Ohio EPA was preparing to launch a survey designed to learn what prevents and motivates businesses that generate scrap tires to comply with Ohio's regulations. Ohio EPA intended to survey both owners of businesses that generate scrap tires and the Agency's partners that regulate scrap tire generators. These partners include solid waste management district staff, Ohio EPA and health department inspectors, and local law enforcement officers. Ultimately, Ohio EPA planned to use the responses to develop a statewide approach for providing education and outreach to scrap tire generators.

Chapter 8 — A Program for Managing Household Hazardous Waste

Household hazardous waste (HHW) is any material discarded from the home that may, because of its nature, pose a threat to human health or the environment when handled improperly. HHW can have many of the same properties as industrial hazardous waste. However, because of the small amount of HHW generated at a household and impracticability of regulating every household, HHW is specifically excluded from regulation as a hazardous waste by both the federal and Ohio's hazardous waste programs.

SWMDs are required, in their solid waste management plans, to provide a strategy to address HHW. The specific strategy chosen is left to the SWMD's discretion. Thus, as would be expected, there is a wide range of strategies being implemented by Ohio's SWMDs. Some SWMDs focus their attention on preparing and distributing literature regarding alternatives to hazardous materials and proper ways of managing HHW. Other SWMDs provide technical assistance to homeowners via telephone hotlines. Still other SWMDs host collection programs for HHW from residents. In 2017, more than half of the SWMDs provided collection programs for their residents.

Chapter 9 — Recycling Market Development

Having adequate demand for recyclable materials is widely acknowledged as a critical component for the success of recycling programs. Strong demand translates into strong markets and higher prices paid for recovered materials. Higher prices increase the economic incentive for collecting materials, stimulate investment by private waste companies in improved processing and collection systems, and may lead private companies to more aggressively expand their customer bases. Strong demand and markets also make creating and expanding residential recycling services more attractive as the net costs associated with these programs decrease due to the increased return on the collected materials. The same dynamics make recycling more attractive for commercial and industrial generators of waste. Ultimately, strong demand for recyclable materials results in the high value of those materials as well as improved economic return and lower costs associated with recycling activities. These factors make recycling a more attractive choice when compared to the alternative management option – disposing of the materials in landfills.

Establishing a market development strategy for Ohio is one of the functions of the state plan that is especially relevant to that state's recycling industry. This is particularly true given the current low quality of recovered materials. Therefore, this state plan provides an analysis of the barriers and opportunities for four materials: food waste, plastics, glass, and fiber. Ohio's main vehicle for influencing markets is the recycling and litter prevention grant program. Therefore, Ohio EPA will evaluate the priorities for grant funding and adjust those priorities as needed. In addition, there are multiple opportunities for Ohio EPA to work with other stakeholders to improve Ohio's demand for recovered materials. Some of the opportunities identified for the market development strategy include:

- Making equipment for food recovery eligible for grant funding;
- Assist potential owners/operators of class 2 composting facilities identify acceptable sites;
- Leveraging Ohio's grants with grants and loans available through other sources;
- Conducting a study of Ohio's material recovery facilities (MRF) to identify how best to target investments in equipment;
- Establishing a glass depot in northeastern Ohio to give local service providers a local drop-off point to process glass to remove major contaminants and to consolidate glass for transportation to southwestern Ohio;
- Establishing a plastic-only MRF; and
- Establishing a fiber-only collection program.

Implementing those opportunities would require cooperation from many stakeholders, including state and local governments, private waste companies, manufacturers that use recovered materials as feedstock, and solid waste management districts.

Chapter 1: Introduction

In the mid- to late-1980s, Ohio faced several significant solid waste management issues. These issues were due, in part, to the lack of a comprehensive regulatory structure for overseeing solid waste disposal facilities and partly due to the lack of planning for how to manage Ohio's solid waste. To resolve these issues, Ohio's General Assembly quickly introduced and passed House Bill 592. House Bill 592 took effect on June 24, 1988 and resulted in a comprehensive revision to Ohio's 1967 solid waste law. House Bill 592 did the following:

- Required the director of Ohio EPA to adopt comprehensive regulations governing solid waste disposal facilities. These regulations were required to address, among other things, best available technology (BAT) design requirements, financial responsibility, closure of facilities, and post-closure care. The rules became effective on March 1, 1990. Although the rules have been revised several times since, the rules retain the basic components required by House Bill 592;
- Created the Solid Waste Management Advisory Council (SWAC);
- Required the director of Ohio EPA, with the advice of SWAC, to prepare and adopt a state solid waste management plan;
- Required the board of county commissioners of each of Ohio's 88 counties to establish a solid waste management district (SWMD), either individually or jointly with one or more other counties;
- Required each SWMD, working through a policy committee, to prepare, adopt, ratify, and submit a solid waste management plan to Ohio EPA for approval; and,
- Required owners and operators of solid waste facilities in operation prior to Jan. 1, 1980 to incorporate best available technology (BAT) into their facilities.

Ohio EPA's Advisory Council

Prior to 2015, Ohio EPA worked with SWAC to prepare the state solid waste management plan. In 2015, Ohio's 131st General Assembly created the Materials Management Advisory Council (MMAC) by combining SWAC with the former Recycling and Litter Prevention Advisory Council.

MMAC's primary purpose is to provide advice and guidance to the director of Ohio EPA on solid waste issues, including updates to the state solid waste management plan and Ohio EPA's recycling and litter prevention grant programs. The council is also tasked with facilitating partnerships that expand markets for recycled commodities.

The council is comprised of 13 members appointed by the Governor to serve three-year terms. The composition of the council is designed to include key stakeholders in Ohio's comprehensive solid waste management system and includes six members representing private interests and seven representing public interests.

The current members of MMAC and who they represent are presented in the following table:

Member Name	Affiliated Organization	Position Representing
Commissioner John Bayliss	Logan County Board of County Commissioners	Counties
Kelly Bensman	Hull & Associates	General Public
Alex Boehnke	Ohio Council of Retail Merchants	Private Sector
Charles DeJonckheere	Hamilton County Health Department	Health Districts
Michael Dinneen, Chair	Construction and Demolition Association of Ohio	Private Sector
Jennifer Fenderbosch, Secretary	City of Avon Lake	Municipalities
Jennifer Hicks	Delaware, Knox, Marion, Morrow Solid Waste District	Solid Waste Management Districts
Kimberly McConville	Ohio Soft Drink Association	Private Sector
Beth Mowrey	Shelly Company	Private Sector
Frank Szollosi	National Wildlife Federation	Environmental Advocacy
Kathy Trent, Vice-Chair	Waste Management, Inc.	Private Sector
Brian Winter	Scotts-Miracle Gro	Private Sector
Paul Wise	Genoa Township	Townships

The State Plan

The Ohio Revised Code (ORC) requires the state plan to be prepared by Ohio EPA, with the advice of MMAC. As stipulated in ORC Section 3734.50, the state plan must address eight specific mandates:

- Reduce reliance on the use of landfills for the management of solid waste;
- Establish objectives for solid waste reduction, recycling, reuse, and minimization (addressed in Chapter 3);
- Establish restrictions on the types of solid waste disposed of by landfilling for which alternative management methods are available (addressed in Chapter 4);
- Establish revised general criteria for locating solid waste facilities (addressed in Chapter 5);
- Examine alternative methods for disposing of fly ash and bottom ash resulting from burning mixed municipal solid waste (MSW) (addressed in Chapter 6);
- Establish a statewide strategy for managing waste tires (addressed in Chapter 7);
- Establish a program for the proper separation and disposal of hazardous waste generated by households (addressed in Chapter 8); and
- Develop specific recommendations for legislative and administrative actions to promote markets for products containing recycled materials and to promote the use by state government of products containing recycled materials (addressed in Chapter 9).

Solid Waste Management Districts

The solid waste law created by House Bill 592 requires the board of county commissioners of each county in Ohio to be a member of a SWMD, either individually or in conjunction with one or more other counties. Ohio's 88 counties are currently organized into 52 SWMDs. Of those 52 SWMDs, 37 are single county SWMDs and 15 are joint SWMDs consisting of two or more counties. The number of counties in the joint county SWMDs ranges from two to six counties. The map in Figure 1-1 delineates the jurisdictions of the 52 SWMDs.

Each SWMD is required to prepare and implement a solid waste management plan. This plan must account for how all solid waste generated within the SWMD will be managed over the life of the plan. The SWMD's solid waste management plan must also demonstrate how the SWMD intends to achieve the goals of the state plan. Solid waste management plans are prepared in accordance with a format prescribed by Ohio EPA and the requirements contained in OAC Rule 3745-27-90.

Figure 1-1: Map of Ohio's Solid Waste Management Districts

Ohio's Joint Solid Waste Management Districts

Adams, Clermont
Allen, Champaign, Hardin, Marion, Shelby, Union
Athens, Hocking
Belmont, Jefferson
Carroll, Columbiana, Harrison
Coshocton, Fairfield, Licking, Perry
Defiance, Fulton, Paulding, Williams
Delaware, Knox, Marion, Morrow
Fayette, Highland, Pickaway, Ross
Gallia, Jackson, Meigs, Vinton
Geauga, Trumbull
Guernsey, Monroe, Morgan, Muskingum, Noble, Washington
Lawrence, Scioto
Ottawa, Sandusky, Seneca
Stark, Tuscarawas, Wayne

Changes in Waste Management Practices

Chinese National Sword

In 2018, China instituted an import ban to prevent contaminated recyclables from entering the country. Prior to the ban, China was a destination for low quality, highly contaminated recyclables. China established its ban, known as the Chinese National Sword, by establishing strict quality standards for recovered materials that can be imported. The standards allow for only nominal contamination. Much of the available supply of recovered materials from the United States is far too contaminated to meet those standards. Therefore, the ban has effectively stopped the flow of material from the United States to China.

This ban affected the United States in an extreme manner and has led communities and service providers to evaluate the sustainability of their recycling services and the mix of materials collected. While many communities have chosen to continue recycling services in the short-term, Ohio and the entire nation must improve their processes to provide higher quality materials and adjust to the realities of the new world market.

Most of Ohio's recycling stream stays within U.S. markets. However, due to the Chinese National Sword, U.S. markets now have an excess supply for a limited demand. This excess supply combined with the high contamination led to drastic decreases in the selling prices of recyclable materials. It has also led to an over-supply of available recyclables which makes marketing poor quality recyclables difficult.

Because of its ban on accepting contaminated material, China no longer imports enough fiber (paper and corrugated cardboard) to supply the Country's manufacturing needs, which is about 20 million tons. To source

that material, China intends to open paper mills in the United States and export processed paper fiber to the country. China will need recovered fiber to feed those mills. The demand created has the potential to balance out the market and return prices of recovered fiber closer to what they were before the Chinese National Sword was put into place.

Recycling Contamination

Ohio EPA plans to continue to monitor the recycling market. In the meantime, Ohio EPA awarded a grant of approximately $320,000 to The Recycling Partnership (The Partnership) to combat the contamination issue in Ohio. The Partnership is a national nonprofit transforming recycling across America. The need to improve the quality of recyclables is a high priority considering today's market conditions and contamination rates in excess of 25 percent. This challenge is compounded by the recent restrictions by China on recyclable materials that exceed 0.5 percent contamination.

Due to the market conditions and current state of recycling, Ohio EPA and The Partnership partnered on a contamination reduction effort. The purpose of this effort is to partner with Ohio communities, solid waste management districts, and private waste companies by providing financial and technical assistance to develop and implement a comprehensive education and operations behavior strategy. The goal of the strategy is to decrease contamination from curbside recycling programs while increasing recycling. Implementing the strategy involves providing targeted education and outreach, inspecting recycling carts, leaving tags on carts that contain unacceptable items, and rejecting contamination carts.

At the end of the project, The Partnership will provide a toolkit consisting of a video and template educational materials. Communities wanting to replicate the contamination reduction strategy can use those materials.

Plastic Production

Overall, the increase of plastic has had a serious effect on the recycling stream. Plastics have replaced traditional, heavier packaging, like glass, which has changed the overall composition of the recycling stream and the weight of material recovered. This has caused a change in how materials are processed and led to confusion about what can and can't be recycled. Typically, only plastic numbers 1 and 2, in the shape of a bottle or jug, can be recycled. However, due to gaps in communication and the persona of plastic's recyclability, plastic of all numbers, shapes, and sizes finds their way into the recycling stream.

Online Shopping

Online shopping has increased exponentially over the past decade, causing increases in cardboard and packaging material in the United States' waste stream. "About a third of adults buy something on a computer or phone at least once per week, up from 21 percent in 2013, according to a new survey from a consulting firm that watches e-commerce trends"[2]. In 2000, only 22 percent of Americans reported that they made a purchase online. As of 2016, that figure had tripled to 79 percent of Americans[3].

In recent years, a trend called "lightweighting" has taken place alongside the increase of online shopping. Lightweighting is the process of converting packaging to lighter materials, such as plastic or cardboard, or cutting down on the amount of packaging used. Companies have realized that by lightweighting their shipments, they can cut down on shipping costs and potentially minimize their bottom line. Many companies also make these changes to reduce their carbon footprint. However, companies must be aware that even though the lighter packaging will reduce the amount of fuel used, shipments sent, and material produced, the new packaging can sometimes be more difficult to recycle (for example, plastic film or plastic not in bottle form).

[2] Paquette, Danielle. July 13, 2017. We're starting to shop online as often as we take out the trash. Washington Post. https://www.washingtonpost.com/news/wonk/wp/2017/07/13/how-your-shopping-habits-are-hurting-american-jobs-especially-today/?noredirect=on&utm_term=.b51fd3365462

[3] Anderson, Monica and Aaron Smith. December 19, 2016. Online Shopping and E-Commerce. Pew Research Center. https://www.pewinternet.org/2016/12/19/online-shopping-and-e-commerce/

Electronic Media

The increase in electronic media and the growth in non-print communications, such as social media, have changed the way our society receives information. These changes have decreased the volume of newspaper and office paper being generated and, therefore, recycled.

Overall, consumption of residential papers and newspaper dropped by more than four million tons in the last 10 years. Further, single stream recycling services have resulted in a lower quality paper mix collected through single stream recycling services. Unfortunately, even with the decrease in supply, there remains little to no market for this material after it is recovered.

Solid Waste Generation

Generation is calculated by adding together waste that was disposed of and waste that was recycled. Recycling data is reported to Ohio EPA by Ohio's 52 SWMDs through the annual district report (ADR). SWMDs obtain the recycling data by surveying communities, businesses, industries, and other entities that recycle. Disposal data is reported to Ohio EPA by owners and operators of solid waste facilities through an annual operational report.

In 2017, Ohioans generated 31.6 million tons of solid waste. This translates into a per capita generation rate of a little less than 15 pounds per person per day. Broken down by sector, Ohioans generated approximately 14.1 million tons of R/C solid waste. This equates to a generation rate of a little more than 6.6 pounds per person per day. Ohio's industrial sector generated solid waste at a rate of approximately 8.2 pounds per person per day for a total of a little more than 17.5 million tons.

Generation Trends

Ohio EPA's data shows that Ohioans generated more solid waste each year between 1990 to 2007. Ohio's records show that R/C waste generated decreased sharply between 2008 and 2009, likely related to the national recession. Following that decrease, R/C waste generated has been steadily increasing back to the 2008 total. In 2017, the R/C waste generation rate was 6.64 pounds per person per day.

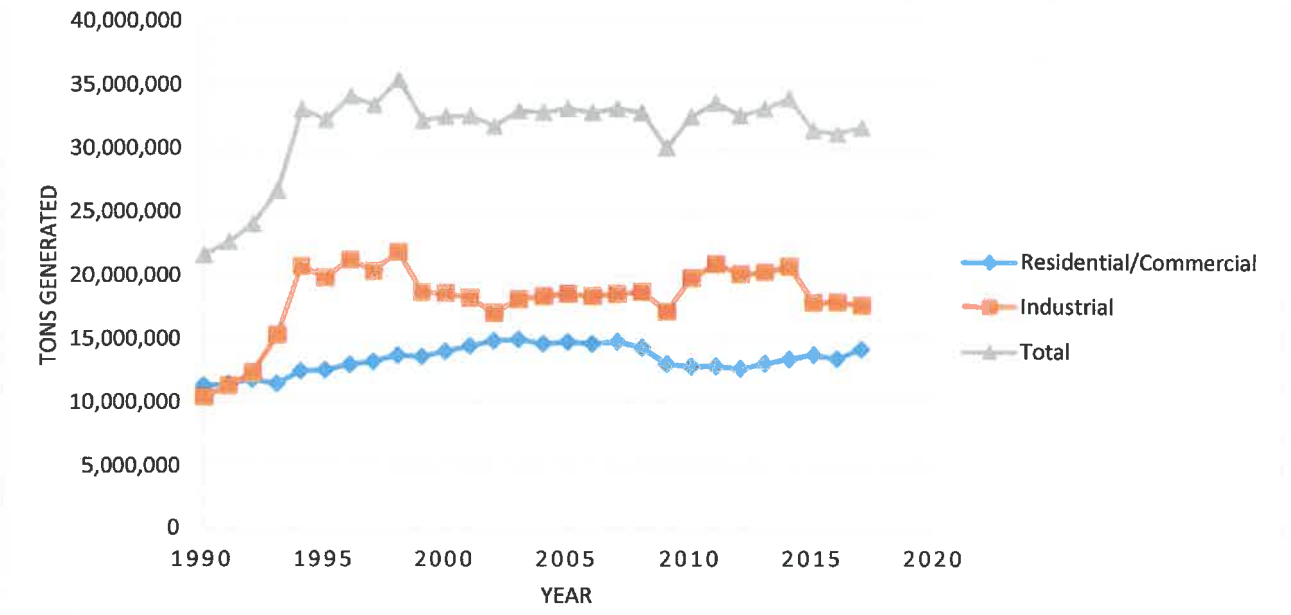


Figure 1-2: Solid Waste Generated: 1990 to 2017

Like the R/C sector, the industrial sector experienced an overall increase in the amount of waste generated in the 1990s. However, the increase in industrial waste generated was much more inconsistent than the R/C

sector. Following the decline in 1999, and except for dips in 2003 and 2009, the industrial sector generated relatively steady amounts of waste in the 2000s. In 2010, the industrial sector saw a large increase in waste generation, plateauing until 2014. Since then, the industrial waste steam has been steadily decreasing. In 2017, Ohio reached its lowest point in industrial waste generation since 2009.

Solid waste generated by both sectors resulted in a total solid waste generation rate of 14.88 pounds per person per day (ppd) in 2017.

Solid Waste Disposal

Municipal solid waste (MSW) - In 2017, there were 38 licensed MSW landfills that were used to dispose of 10.01 million tons of Ohio-generated MSW. This led to a disposal rate of 4.71 ppd.

Industrial solid waste (ISW) landfills are used to dispose of manufacturing waste. Currently, all ISW landfills in Ohio are owned/operated by the manufacturing companies that use the landfills. These are known as captive landfills, as the owning company is the only company that can dispose of its ISW in the facility. In 2017, there were 11 active ISW landfills that were used to dispose of more than 4.5 million tons.

As can be seen from Figure 1-3, with a few minor exceptions, the amount of Ohio-generated waste disposed of in landfills has had little fluctuation since 2000.

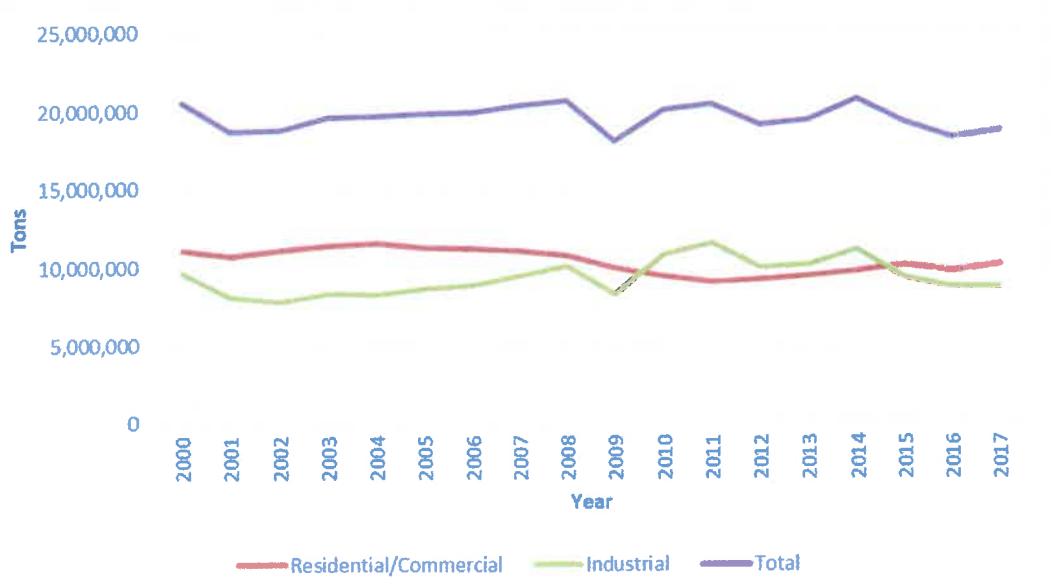


Figure 1-3: Ohio-Generated Waste Disposed (2000-2017)

Solid Waste Disposal Capacity

At the end of 2017, Ohio had 38 operating MSW landfill facilities with remaining gross, permitted, available, disposal capacity of 785,394,244 cubic yards. If the amount of waste disposed of annually equals the total quantity of waste disposed of in Ohio landfills in 2017 and no additional landfill capacity is approved, Ohio had enough disposal capacity at permitted and licensed facilities for 38.8 years. There was one MSW landfill facility that had been permitted but not constructed. That facility, the Harrison County Landfill, could provide another 58 million cubic yards of disposal capacity if it is operated.

Imports and Exports of Solid Waste

Figure 1-4 illustrates imports of waste into and exports of waste out of Ohio since 2009. As the graph shows, exports increased rapidly from 2015 to 2017. In 2017, waste imports totaled 4.78 million tons (or 25.66 percent of all waste disposed of in Ohio).

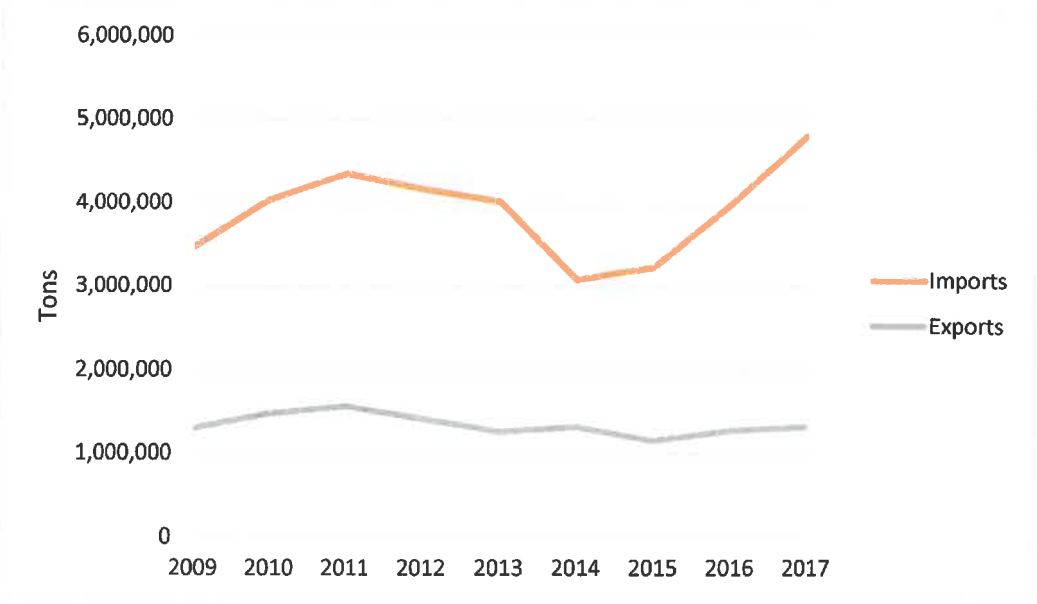


Figure 1-4: Imports and Exports of Solid Waste (2009 to 2017)

In 2017, as in past years, the largest amounts of imported waste came from New Jersey (1,435,688.82 tons) and New York (1,186,654.55 tons). Together, the waste imported from these two states represents about 55 percent of all waste received from other states. Other states that sent significant quantities of waste to Ohio include Pennsylvania, Connecticut, Massachusetts, and West Virginia.

Ohio also exports waste to its neighboring states which helps to offset the overall impact of imported waste on the State. In 2017, Ohio exported approximately 1.3 million tons of waste to facilities in contiguous states. Generally, waste is exported from Ohio to neighboring states when the closest landfill to a community is in another state. Overall, however, Ohio is a net importer of solid waste, to the tune of 3.46 million tons in 2017. Regardless of mitigating factors, the volume of waste imported into Ohio places an additional burden on Ohio's ability to meet its own disposal needs.

Ohio EPA Initiatives

In recent years, Ohio EPA implemented tools designed to assist generators divert usable materials away from landfills. Two notable efforts are the Ohio Materials Marketplace (OMM) and the beneficial use program. Both programs are intended to simplify turning waste into value-added materials. Ohio EPA also studied the economic potential of currently disposed material. The results of this study will help Ohio develop a strategy for improving recovery of usable materials and support businesses that hope to use the material as well.

Ohio Materials Marketplace

On April 4, 2017, Ohio EPA announced the launch of ***the Ohio Materials Marketplace (OMM)***, an online service for Ohio businesses, not-for-profits and government organizations to advertise and trade potentially useful materials that might otherwise be destined for disposal in landfills. OMM is a free online platform that allows members to connect and find solutions to material reuse and recycling needs. OMM helps Ohio continue progress toward creating a circular economy and reducing its reliance on landfills.

OMM is actively managed and marketed by Ohio EPA, with support from platform administrative partners including the United States Business Council for Sustainable Development, the Ohio By-Product Synergy Network and Ohio's Solid Waste Management Districts. OMM realized steady growth in participation and material transactions throughout its second year of operation. The OMM ended year two on April 4, 2019 with a cumulative 3.7 million pounds of material diverted from Ohio's landfills and more than $208,000 in savings to members through virgin material substitution costs and avoided landfill costs.

OMM members include a wide variety of business and organization types that are actively engaged in continuous transaction conversations through the marketplace platform. Material listings, both available and wanted, are as diverse as the marketplace membership and continue to reveal trends in material management challenges across Ohio.

Beneficial Use Program

Ohio EPA approves beneficial use projects that diverted solid waste away from landfills through Integrated Alternative Waste Management Plans (IAWMP) and Land Application Management Plans (LAMP). To supplement those programs and simplify the beneficial use of certain wastes, Ohio ***adopted beneficial use rules***, which became effective on March 31, 2017. Ohio EPA's Division of Materials and Waste Management (DMWM) manages the program.

The following materials are addressed in the rules:

- foundry sands;
- drinking water treatment residuals;
- waste materials burned for energy recovery;
- sewage sludge (biosolids) incinerator ash; and
- dredged material from federal navigational channels in Lake Erie

Under the beneficial use rules, the materials listed above may be used in applications authorized by rule, burned for energy recovery, and covered by general or individual permits.

When used in accordance with specified conditions, the five materials may be used as ingredients in construction materials such as cement or asphalt, with no input or authorization required by DMWM. They may also be used as a fuel or ingredient in a combustion unit, again with no further authorization required from DMWM (other authorizations for air and water emissions may apply to these activities).

For materials not included in OAC Chapter 3745-599, such as paper sludge and non-hazardous waste baghouse dust, Ohio EPA continues to offer IAWMP and LAMP.

Ohio EPA will continue to collaborate with all interested parties to add materials to OAC Chapter 3745-599, develop additional beneficial uses and identify ways to improve the rules.

Economic Impact Study

Having clean, consistent supplies of recovered materials available is critical for supporting Ohio's existing businesses and attracting new businesses to the State. To date, Ohio's recovery efforts have supplied recyclable materials to many end users and manufacturers in Ohio. Even so, there is still great potential for increasing the supply of recyclable materials and boosting Ohio's economic growth.

To quantify this potential, Ohio commissioned a waste characterization and economic impact study. This study was intended to identify the current statewide waste stream to improve Ohio's strategy for materials management. The results of the study were published in 2019 in a report titled, Economic Impact Potential of Recycling in Ohio. This report documents the revenue-generating potential of recyclable commodities currently being landfilled.

According to the study:

- The current potential value of recyclable materials that are being landfilled is $260.5 million based on commodity prices as of September 2018. Other materials that can be effectively collected as a separate material stream have a current value of $88.1 million. It is difficult to project future prices for recycled commodities in the volatile global market.

- The potential number of jobs that could be created by the recycling of marketable materials and all material that is currently recyclable but landfilled is 19,799. An additional 1,372 jobs could be created if yard waste and wood wastes were composted. The total jobs that could be potentially created is 21,171.
- The value of the cost of avoided disposal, of potentially recoverable material, based on the average gate rate of $43.42/ton for disposal, is $85.9 million. Yard waste, food waste and construction and demolition waste wood is disposed at a cost of $148.9 million. Potentially recyclable materials, such as durable and rigid plastics and LDPE films, are disposed at a cost of $40.5 million. The total cost for disposal is $275.3 million.

As illustrated in the statistics above, Ohio must continue its efforts to return usable materials to Ohio's economy. If done effectively, recovery efforts can significantly add to Ohio's economy. Chapter 9 (Market Development) presents several strategies intended to both improve the quality of Ohio's recyclables and facilitate expanding markets for that material.

Chapter 2: Implementing the 2009 State Solid Waste Management Plan

Implementing the state solid waste management plan (state plan) is a collaborative effort among many partners, ranging from agencies at all levels of government to private waste management companies. However, this chapter focuses on efforts Ohio's 52 solid waste management districts (SWMD) have made to achieve the goals of the 2009 State Solid Waste Management Plan (2009 State Plan).

As was discussed in Chapter 1, the 2009 State Plan established nine goals designed to further waste reduction and recycling in Ohio. These goals were intended to reduce Ohio's reliance upon landfills for the management of solid waste, to increase available recycling opportunities, and to increase recycling participation.

In addition, the 2009 State Plan contained 11 strategies intended to be implemented by State of Ohio agencies. These strategies embodied efforts that those agencies could take to foster recycling efforts and opportunities in Ohio. Ohio's efforts to accomplish these 11 strategies on a statewide level are described at the end of this chapter.

The nine goals, as set forth in the 2009 State Plan, are as follows:

Goal 1 - Recycling Infrastructure
The SWMD shall provide its residents and commercial businesses with access to opportunities to recycle solid waste. At a minimum, the SWMD must provide access to recycling opportunities to 90 percent of its residential population in each county and ensure that commercial generators have access to adequate recycling opportunities.

Goal 2 - Waste reduction and recycling rates
The SWMD shall reduce and recycle at least 25 percent of the solid waste generated by the residential/ commercial sector and at least 66 percent of the solid waste generated by the industrial sector.

Goal 3 - Outreach and Education – Minimum Required Programs
The SWMD shall provide the following required programs: a website; a comprehensive resource guide; an inventory of available infrastructure; and a speaker or presenter.

Goal 4 - Outreach and Education
The SWMD shall provide education, outreach, marketing, and technical assistance regarding reduction, recycling, composting, reuse, and other alternative waste management methods to identified target audiences using best practices.

Goal 5 - Restricted wastes, household hazardous wastes (HHW), and electronics
The SWMD shall provide strategies for managing scrap tires, yard waste, lead-acid batteries, HHW, and electronics.

Goal 6 - Economic incentives
The SWMD shall explore how to incorporate economic incentives into source reduction and recycling programs.

Goal 7 - Measure greenhouse gas reduction
The SWMD will use U.S. EPA's Waste Reduction Model (WARM) (or an equivalent model) to evaluate the impact of recycling programs on reducing greenhouse gas emissions.

Goal 8 - Market Development
The SWMD has the option of providing programs to develop markets for recyclable materials and the use of recycled-content materials.

Goal 9 - Reporting
The SWMD shall report annually to Ohio EPA regarding implementation of the SWMD's solid waste management plan.

In their solid waste management plans, all SWMDs are required to demonstrate that they provide or will provide programs to address the goals established in the state plan.

Goals 1 and 2 have always been considered the primary goals. Although encouraged to attempt to achieve both goals, SWMDs were required to demonstrate compliance with either Goal 1 or Goal 2, not both. Apart from Goal 8, which was a voluntary goal, the remaining goals were mandatory. As a result, SWMDs were required to demonstrate compliance with a minimum of seven of the nine goals.

Solid Waste Management District Solid Waste Management Plans

Of Ohio's 52 SWMDs, 42 are operating under solid waste management plans with Goal 1 as the designated goal. The remaining 10 SWMDs have plans that demonstrate compliance with Goal 2. The 42 SWMDs under Goal 1 account for 77 of Ohio's 88 counties, or 87.5 percent, while the 10 SWMDs under Goal 2 account for 11 of Ohio's 88 counties, or 12.5 percent.

The remainder of this chapter reviews SWMD's efforts and experiences toward meeting the nine goals of the 2009 State Plan and Ohio's efforts toward implementing the 11 statewide strategies.

Progress Made Toward Achieving Goal 1

The SWMD shall provide its residents and commercial businesses with access to opportunities to recycle solid waste. At a minimum, the SWMD must provide access to recycling opportunities to 90 percent of its residential population in each county and ensure that commercial generators have access to adequate recycling opportunities.

In its solid waste management plan, a SWMD meets Goal 1 by demonstrating that:

- At least 90 percent of its residents in each county have or will have access to recycling opportunities (will change to 80 percent with the revised state plan);
- Commercial and institutional generators have access to recycling opportunities;
- Recycling opportunities will be made available within the first three years of the planning period covered by the solid waste management plan;
- Each recycling opportunity will accept at least five recyclable materials; and
- The SWMD encourages participation in recycling opportunities through outreach and/or financial incentives.

Even though they have the choice of meeting Goal 1 or Goal 2, SWMDs need recycling opportunities to achieve either goal. In 2017, SWMDs relied on the following recycling opportunities to meet both goals.

- 249 subscription curbside programs;
- 449 non-subscription curbside programs; and
- 1,212 drop-off locations.

Progress Made Toward Achieving Goal 2

The SWMD shall reduce and recycle at least 25 percent of the solid waste generated by the residential/ commercial sector and at least 66 percent of the solid waste generated by the industrial sector.

Statewide Waste Reduction and Recycling Rates

Figure 2-1 and Table 2-1 present data regarding waste reduction and recycling in Ohio for most of the years that the 2009 State Plan has been in effect (except for 2018). Although Ohio does not have statewide goals for the R/C and industrial sectors, Ohio EPA does track statewide data for both sectors. That data is then used to calculate Ohio's total reduction/recycling rates.

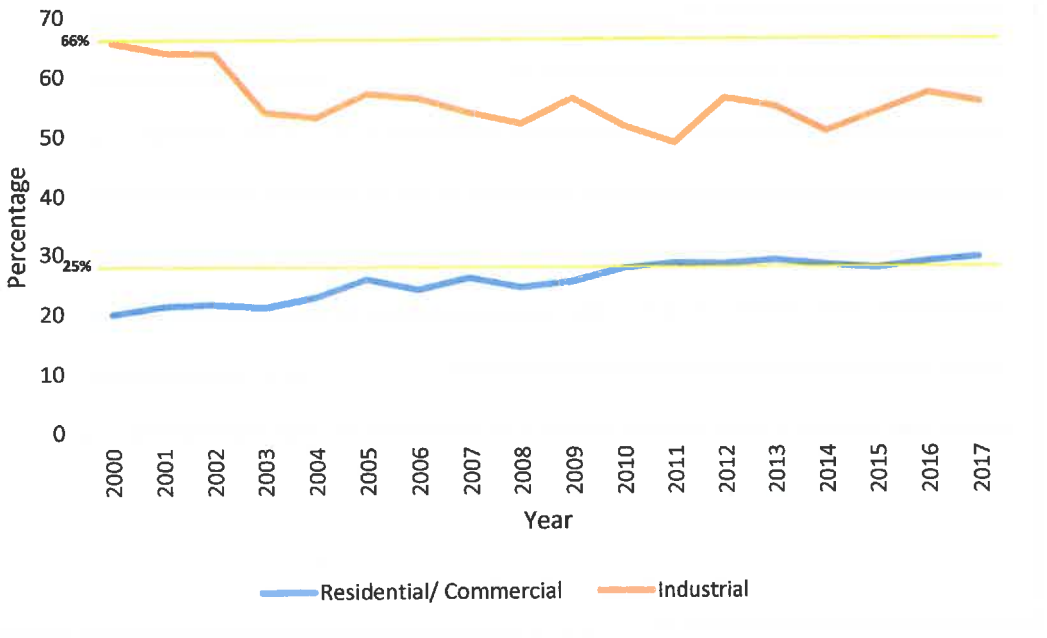


Figure 2-1: Ohio's Waste Reduction/Recycling Rate – 2000-2017 (by percentage)

Annual variations in the industrial recycling rate are likely attributable to limitations with collecting data rather than actual recycling activity. The data captured for industrial recycling represents only a portion of the total material recycled by industrial generators. Ohio would be able to demonstrate a much higher industrial recycling rate if data from all industrial generators was available. The issues with collecting data led Ohio EPA and MMAC to replace the industrial waste reduction/recycling goal with a goal focused on providing industrial generators with programs and assistance to improve their recycling efforts.

Table 2-1: Ohio's Waste Reduction/Recycling Rate by Sector – 2000-2017 (by percentage)

Year	Residential/ Commercial	Industrial
2000	20.0	65.6
2001	21.3	64.0
2002	21.6	63.7
2003	21.1	53.8
2004	22.7	52.9
2005	25.7	56.9
2006	23.9	56.1
2007	25.9	53.6
2008	24.3	51.8
2009	25.2	56.0
2010	27.4	51.4
2011	28.3	48.5
2012	28.1	55.9
2013	28.7	54.5
2014	27.9	50.3
2015	27.3	53.5
2016	28.4	56.7
2017	29.1	55.2

Residential/Commercial Sector

Statewide, SWMDs collectively reported that 29.1 percent (4,098,867 tons) of R/C solid waste was reduced and recycled in 2017, the highest rate ever achieved. As shown in Figure 2-2, a small number of materials comprised most of the R/C material reduced/recycled. The top five recovered materials by weight and percent of total (excluding "all else") in 2017 were:

- yard waste – 1,242,816.80 tons (30 percent);
- corrugated cardboard – 822,242.70 tons (20 percent);
- metals – 526,437.40 tons (13 percent);
- all other paper – 450,189.20 tons (11 percent); and
- commingled recyclables – 256,582.30 tons (6 percent).

Collectively, those five materials made up approximately 80 percent of all R/C solid waste reduced/recycled in 2017. Metals is a unique category because it does comprise one of the largest recovered components but does not comprise one of the largest components of the overall waste stream.

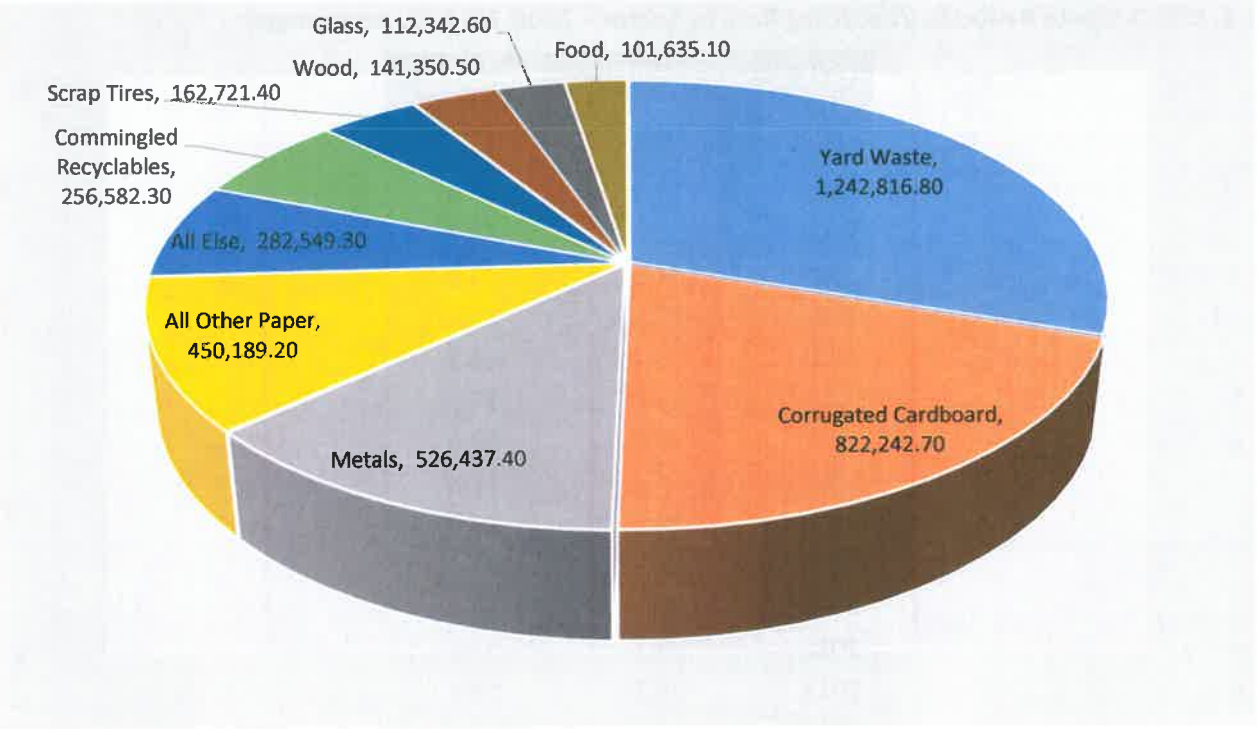


Figure 2-2: Residential/Commercial Materials Reduced and Recycled in 2017 (in tons)

Industrial Sector

Statewide, SWMDs reported that 55.2 percent (8,893,655 tons) of industrial solid waste was reduced and recycled in 2017.

Figure 2-3 shows the types and amounts of materials reduced and recycled. As with the R/C sector, most of the industrial material recycled and reduced consisted of a small number of materials. In fact, two materials, metals and flue gas desulfurization waste (FGD), made up 71 percent of all industrial solid waste reduced/recycled.

The top five materials by weight and percent of total (excluding "all else") in 2017 were:

- metals – 4,101,824.20 tons (46 percent);
- FGD – 2,253,785.20 tons (25 percent);
- corrugated cardboard – 592,128.20 tons (seven percent);
- wood – 466,026.60 tons (five percent); and
- food – 322,544.00 tons (four percent).

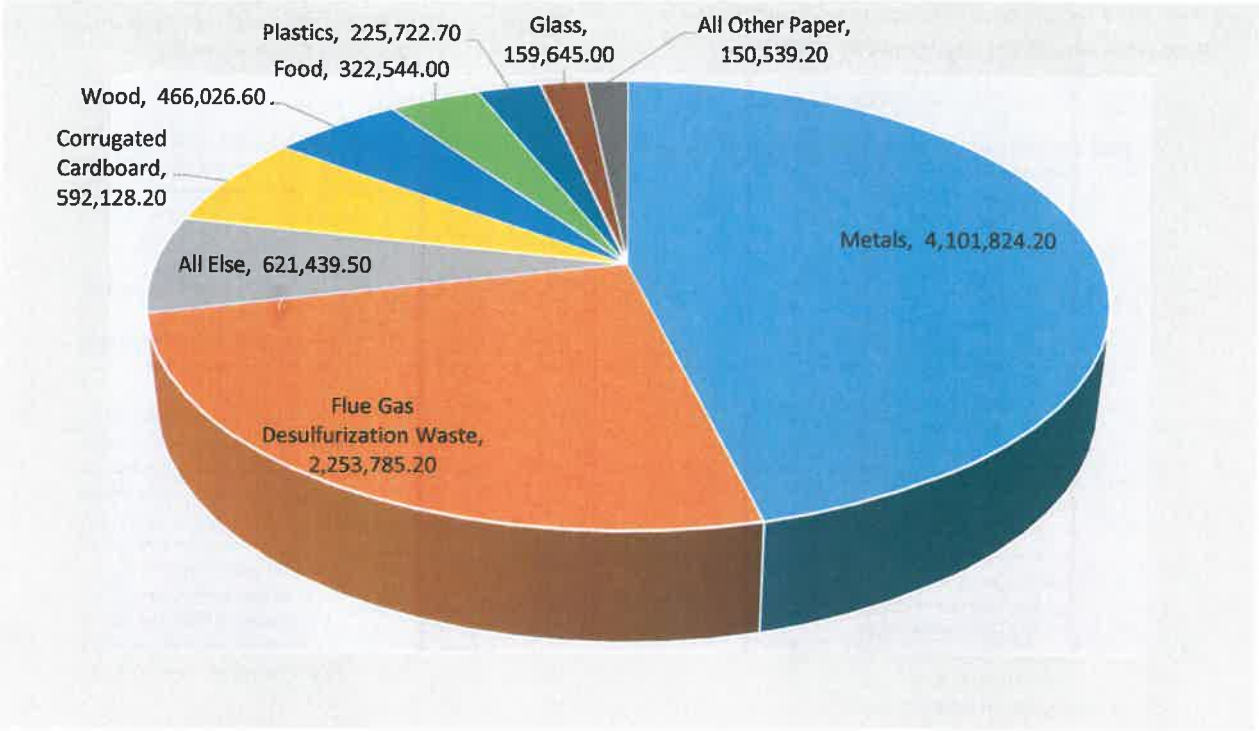


Figure 2-3: Industrial Materials Reduced and Recycled in 2017 (in tons)

Solid Waste Reduction/Recycling Rates for the 52 SWMDs

As shown in Figure 2-4, R/C sector recycling rates in 2017 varied widely among SWMDs, from a low of 3.22 percent to a high of 52.75 percent. Twenty-seven SWMDs reported having recycled enough material to achieve Ohio's R/C sector WRR goal of 25 percent.

Industrial recycling/reduction rates also varied significantly in 2017. As shown in Figure 2-5, the rates achieved by the SWMDs ranged from a low of one percent to a high of 99 percent. Thirty-five SWMDs reported having recycled enough industrial material to achieve Ohio's WRR goal of 66 percent.

Figure 2-4: 2017 Residential/Commercial Solid Waste Reduction and Recycling Rates by SWMD

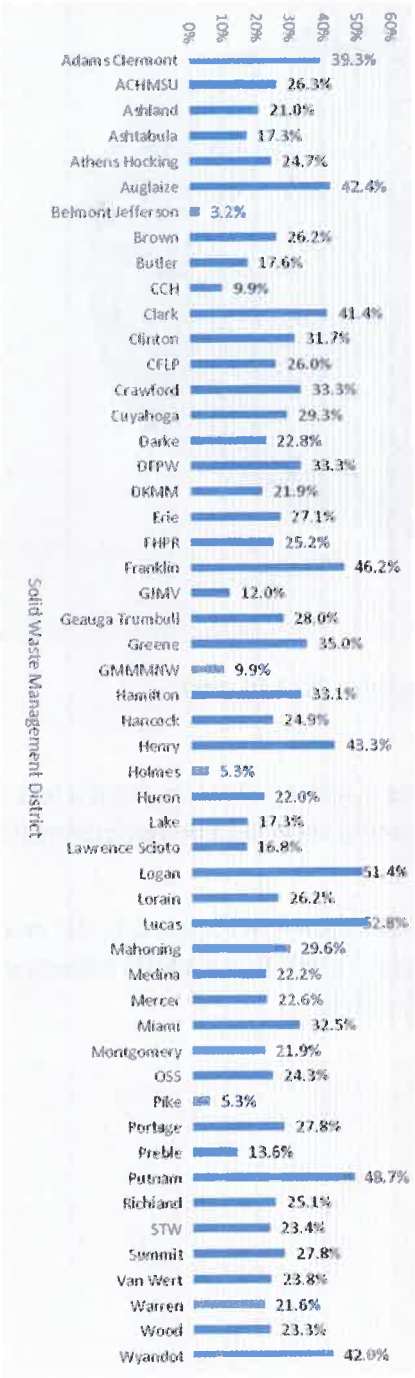
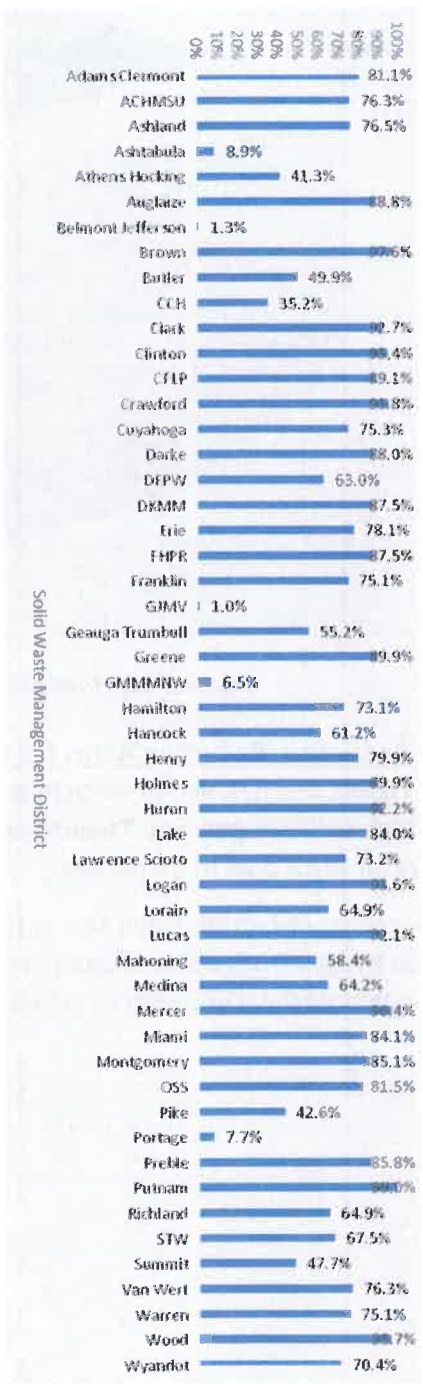


Figure 2-5: 2017 Industrial Solid Waste Reduction and Recycling Rates by SWMD



Key

ACHMSU = Allen-Champaign-Hardin-Madison-Shelby-Union
CCH = Carroll-Columbiana-Harrison
CFLP = Coshocton-Fairfield-Licking-Perry
DFPW = Defiance-Fulton-Paulding-Williams
DKMM = Delaware-Knox-Marion-Morrow
FHPR = Fayette-Highland-Pickaway-Ross
GJMV = Gallia-Jackson-Meigs-Vinton
GMMMNW = Guernsey-Monroe-Morgan-Muskingum-Noble-Washington
OSS = Ottawa, Sandusky-Seneca
STW = Stark-Tuscarawas-Wayne

Caveats Regarding Data

Quantitative measures, such as Ohio's waste reduction and recycling rates (reduction/recycling rates), are common benchmarks used to assess the effectiveness of recycling programs and for comparing programs. Quantitative measures are also useful for evaluating trends over time. However, there are some limitations inherent in the data used to calculate recycling statistics. These limitations must be considered when forming conclusions about recycling trends.

In addition to the limitations inherent in the data, changes in waste management practices in Ohio affect the reduction/recycling rates. Several of these changes were described in Chapter 1.

Obtaining Data

One of the most chronic limitations is the challenge of simply obtaining data. As will be discussed in association with Goal 9, each SWMD is required to report to Ohio EPA annually regarding, among other things, the quantities of materials recycled during the previous year within the SWMD. However, the entities that have the data are not required under Ohio's regulations to report to the SWMDs. Unless the SWMD has a means of requiring reporting, such as through a contract, any data the SWMD receives is provided voluntarily by the entities that generate, collect, process, and manage recyclable materials. Consequently, the SWMD has little to no control over the number of entities that respond to a survey or the quality of the data it receives. Often, SWMDs achieve relatively low response rates to surveys and must report incomplete data.

SWMDs can also receive surveys from different entities each year, which can result in significant variations in the annual reduction/recycling rates. This is particularly true for respondents that report large quantities of material. The effects of including or excluding a major recycler's quantities are sometimes discernable in the statewide rate. Consequently, the effects of a major recycler's quantities on the individual SWMD's reduction/ recycling rate are even more pronounced.

The difficulty of obtaining data was one of the factors that led Ohio EPA and MMAC to develop a goal focused on providing recycling opportunities and give SWMDs the option of selecting which goal to strive for. This flexibility introduced another limitation that affects calculated reduction/recycling rates. Some SWMDs that opt to pursue Goal 1 may dedicate limited resources to gathering data. This is an anticipated result of having a goal that is focused on providing services rather than on gathering and reporting data.

Limitations on the accuracy of available data also include:

- The level of experience of the person completing the survey;
- Using actual versus estimated weights;
- Double counting materials;
- Inconsistent evaluation methodologies;
- Converting volume to weight;
- Reporting non-creditable materials;
- Accounting for waste eliminated through source reduction;
- Annual versus periodic surveys (some SWMDs survey less than annually and report the same data for multiple years); and
- Combining data from previous years with current data (a SWMD may use data from a previous response for an entity that did not respond to the most recent survey in combination with data from respondents to the most recent survey).

Other Factors

Other unexpected and uncontrollable factors affect the reduction/recycling rate from one year to the next. Some of these factors are:

- Storms, natural disasters, and weather conditions;
- Economic conditions;
- Opening and closing of major waste generators;
- Markets for recyclable materials; and
- Receiving or not receiving data from major waste generators or recyclers.

All the factors listed above affect the overall reliability of a point in time calculation such as an annual reduction/recycling rate. Consequently, Ohio EPA generally focuses on trends over several years when evaluating changes in recycling activity rather than changes, particularly insignificant changes, in recycling statistics from one year to the next.

Progress Made Toward Achieving Goal 3 and 4

The SWMD shall provide the following required programs: a website; a comprehensive resource guide; an inventory of available infrastructure; and a speaker or presenter. The SWMD shall provide education, outreach, marketing, and technical assistance regarding reduction, recycling, composting, reuse, and other alternative waste management methods to identified target audiences using best practices.

The 2009 State Plan and Format 4.0 (the District Solid Waste Management Plan Format prepared by Ohio EPA and required by OAC Rule 3745-27-90) place a focus on SWMDs using behavior changing methodology rather than creating awareness within their programming. By requiring the four programs outlined in Goal 3 and the outreach and education initiative as part of Goal 4, Ohio EPA and MMAC intended that these goals would act as a programming base to build from. All SWMDs currently provide some version of each of these programs.

Unfortunately, evaluating a program's progress toward behavior change is difficult to measure on a statewide level. It can be done on a local level with specific programming, but accumulating statewide results are difficult. There are many factors that go into program success including community awareness, change in recycling rates, improving recycling material collected, creating community leaders, and improving waste reduction infrastructure throughout communities. While the state plan and Format 4.0 provide criteria for meeting Goal 4, SWMDs have significant flexibility to decide how to meet the criteria. That flexibility results in a wide range of scope and programming.

In addition, several SWMDs have adopted outreach priorities within their solid waste management plans. A SWMD first completes a strategic analysis of the programming within the district to determine how effective it is within the community. By doing this, the district can also see specific, potential areas of improvement, which is what the outreach priority is meant to overcome.

One example is Cuyahoga County, which has the priority "to help residents 'Recycle More, Recycle Better.' This campaign message applies to all target audiences whether they are recycling at home or at play. Cuyahoga County focused on creating uniform simplistic messaging that strived to achieve better recycling rates throughout the county.

Hamilton County SWMD took a slightly different route with an outreach priority of paper fiber and organics (food waste and yard trimmings). The district planned to set aside funds that could be used to research and develop new programs directed at the two waste streams. Finally, Lorain County SWMD identified lowering the district's contamination rate as its outreach priority. Lorain County SWMD decided to focus its efforts primarily on residential curbside programs. By focusing on the contamination amount and frequency of curbside programs, the district will increase education outreach and the district's presence to help communities reduce

contamination. By creating outreach priorities specific to communities, SWMDs have been able to achieve great success.

Overall, Ohio's reduction and recycling rate increased by 0.89 percent since 2009, and Ohio's residential and commercial reduction and recycling rate increased by 3.86 percent. These results are not directly correlated to only Goals 3 and 4 but show that progress continues to be made within Ohio.

Progress Made Toward Achieving Goal 5

The SWMD shall provide strategies for managing scrap tires, yard waste, lead-acid batteries, HHW, and electronics.

All SWMDs are required to provide programs to address the following five restricted and difficult to manage waste streams:

- Household Hazardous Waste (HHW);
- Electronics;
- Scrap Tires;
- Lead-Acid Batteries; and
- Yard Waste.

As with Goal 4, SWMDs have maximum flexibility to determine how best to satisfy Goal 5. Thus, as would be expected, the SWMDs differ significantly regarding their approaches to addressing Goal 5. Some SWMDs provide basic information, usually in printed brochures, pamphlets, or flyers, about how to manage the restricted wastes. Other SWMDs own and operate collection facilities where residents can deliver restricted wastes. Some of these SWMDs accept the materials without an associated fee and some charge a user fee.

SWMDs are not required to provide residents with alternatives to disposal for managing restricted wastes. Thus, SWMDs are not required to provide collection programs for the wastes. As is explained in the following paragraphs, many SWMDs do provide the collection programs as services to their residents. These collection events typically are very popular with residents. In the case of HHW, the events typically are expensive and are a major undertaking. In order to be responsive to the needs of their residents, while being financially conscious, many SWMDs offer annual collection programs on a temporary basis.

Household Hazardous Waste

Although HHW is not restricted from being disposed of in landfill facilities, the characteristics of HHW make it a difficult to manage waste stream. Disposing of HHW is the least preferred management method. Thus, SWMDs are required to provide a program to address how to properly manage HHW. The programs that SWMDs offer for HHW include the following: education and outreach regarding alternatives to hazardous products; how to manage HHW; the dangers associated with using hazardous products and dangers associated with hazardous wastes; dedicated hotlines for answering residents' questions; and both temporary and permanent collection programs.

Chapter 8 provides more detailed information regarding HHW management in Ohio. This information includes descriptions of the programs that SWMDs typically provide for educating residents regarding HHW as well as the collection programs offered by SWMDs.

Electronics

The requirement to provide a program addressing the management of end-of-life and obsolete electronic waste (e-waste) was introduced with the 2001 State Plan. As with HHW, e-waste from residential sources is not restricted from being disposed of in landfill facilities. However, the presence of hazardous constituents in e-waste, the volume of e-waste entering the waste stream, and the bulky nature of many electronic devices make e-waste a difficult to manage waste stream.

SWMDS provide a variety of collection programs for electronics within the residential sector. However, the recycling industry for electronics has continued to grow over the past decade, which has reduced the role of SWMDs in providing collection opportunities. Even so, many residents still don't have convenient opportunities to recycle obsolete electronics. Therefore, several SWMDs continue to provide those opportunities.

Scrap Tires

SWMDs provide the following programs for scrap tires: education regarding the proper management of scrap tires and Ohio's scrap tire regulations; collection opportunities for scrap tires; funding for remediating of illegal scrap tire accumulations; and funding for scrap tire enforcement personnel.

Lead-Acid Batteries

Ohio Revised Code 3734.91 to .915 prohibits anyone from disposing of a lead acid battery in a landfill facility. Law also requires wholesalers and retailers of lead acid batteries to take old batteries for recycling when a new one is bought. In addition, any person who generates a lead acid battery must deliver it to a retailer, a wholesaler, a secondary lead smelter, an automotive repair business, a household hazardous waste collection location or event, or a lead acid battery collection or recycling entity or other entity that operates in compliance with the state's hazardous waste rules if they are applicable.

Due to the strength of the existing network for recycling lead-acid batteries, many SWMDs focus their efforts on educating residents where to take lead-acid batteries rather than on programs geared toward collecting the batteries. Even so, many of the SWMDs that provide HHW collection programs accept lead acid batteries through those events.

Yard Waste

SWMDs provide the following programs for yard waste: education regarding the proper management of yard waste and Ohio's yard waste regulations and collection opportunities for yard waste.

Progress Made Toward Achieving Goal 6

The SWMD shall explore how to incorporate economic incentives into source reduction and recycling programs.

The requirement to perform an economic incentive analysis was introduced to SWMDs with the 1995 State Plan. As part of their demonstration of compliance with Goal 1 in their solid waste management plans, SWMDs were required to evaluate the feasibility of implementing financial incentives to encourage increased participation in recycling programs. SWMDs that demonstrated compliance with Goal 2 were not required to perform the analysis. By upgrading the requirement to a goal in the 2001 State Plan instead of leaving it as a component of the demonstration for Goal 1, Ohio EPA and MMAC extended the obligation to perform the analysis to all SWMDs.

Incentive-based programs that either tie the amount recycled to some sort of financial compensation or reduce the cost of recycling have the potential to significantly increase participation in an available recycling program. Incentives can also increase the volume of recyclables collected. Combining a curbside recycling service with a volume-based trash collection/pay-as-you-throw (PAYT) system has been proven to be one of the most powerful tools for increasing the effectiveness of the recycling program.

Ohio EPA and MMAC believe that requiring all SWMDs to perform the analysis is beneficial because it exposes the SWMD to potential programming that the SWMD might not otherwise consider. The analysis can be a tool for making strategic decisions and can provide information that can be used by the policy committee during the process of updating the SWMD's solid waste management plan.

It is difficult to evaluate the effect of this goal on the number of incentive-based programs that SWMDs have implemented as a result of the requirement. Since adoption of the 2001 State Plan, several communities have implemented combined PAYT trash collection and curbside recycling services. In most cases, however, it is not clear if the decision to implement the service was made in response to Goal 6 or some other stimulus.

Progress Made Toward Achieving Goal 7

The SWMD will use U.S. EPA's Waste Reduction Model (WARM) (or an equivalent model) to evaluate the impact of recycling programs on reducing greenhouse gas emissions.

Format 4.0 requires SWMDs to evaluate the impact of recycling programs on reducing greenhouse gas emissions. There are currently 15 of SWMDs that submitted their plan update with Format 4.0.

Progress Made Toward Achieving Goal 8 (optional)

The SWMD has the option of providing programs to develop markets for recyclable materials and the use of recycled-content materials.

Goal 8 of the 2009 State Plan is intended to help develop markets for recyclable materials. Unlike the other goals, however, Goal 8 is optional. Thus, a SWMD could choose to provide market development programs but is not required to do so.

In general, SWMDs compile and make available lists of vendors that offer products made with recycled materials. In addition, many SWMDs include the "Buy Recycled" message in their education and outreach efforts. Many SWMDs also purchase products containing recycled materials and encourage and assist other government offices to do the same.

Progress Made Toward Achieving Goal 9

The SWMD shall report annually to Ohio EPA regarding implementation of the SWMD's solid waste management plan.

In accordance with OAC Rule 3745-27-90, each SWMD is required to submit an annual district report (ADR) to Ohio EPA by June 1 on a form prescribed by the director of Ohio EPA. Previously, Ohio EPA provided SWMDs with a Microsoft Word fillable form and Excel spreadsheet to complete their ADRs. Beginning with the ADR for calendar year 2016, Ohio EPA transitioned to using an online reporting platform called Re-TRAC Connect. This platform is now the prescribed form that all SWMDs use to complete their ADRs.

The primary purpose of the ADR is for Ohio EPA to monitor each SWMD's compliance with its approved solid waste management plan. However, the information submitted via the ADR form is also used to measure each SWMD's progress toward meeting the goals established in the state solid waste management plan. The ADR also helps Ohio EPA track Ohio's overall progress toward achieving those goals.

Progress Made Toward Achieving State Strategies

Strategy 1: Continue to provide financial assistance through the Ohio Department of Natural Resources.

When the 2009 State Plan was written, the Ohio Department of Natural Resources (ODNR) housed and administered the Recycling and Litter Prevention program and community development, litter prevention, and market development grants. These grants provide financial assistance for recycling efforts, including building infrastructure, market development opportunities, and education efforts. In 2012, the Recycling and Litter Prevention Program transferred from ODNR to Ohio EPA. Consequently, the grant programs are now administered through Ohio EPA.

Since moving to Ohio EPA, the recycling and litter prevention program continues to administer the grant programs. Despite adjusting grant priorities, categories, dollar amounts, and other aspects of the grant programs, Ohio EPA administers the grants essentially the same as when ODNR managed them. With the

2018 grant round, Ohio EPA launched an online portal for applicants to submit applications rather than completing and submitting hard copy forms. Ohio EPA continues to refine that platform to improve its usability.

For the 2019 grant round, Ohio will make a few other updates to the grants to address ongoing changes in the recycling industry. Examples are adding academic institutions as eligible applicants, creating a new equipment category for glass and organics, and providing improved consultant and agent services.

Strategy 2: Explore means of obtaining improved reporting on the part of industrial generators.

In 2014, Ohio EPA launched a voluntary statewide, business recycling survey to assist SWMDs obtain data from commercial and industrial generators about recycling efforts. Ohio EPA collaborated with the Ohio Council of Retail Merchants, The Ohio Manufacturers Association, Ohio Chamber of Commerce, the Organization of Solid Waste Districts of Ohio, and the individual solid waste management districts. Ohio EPA created individualized letters and survey forms for each participating solid waste management district, hosted a dedicated webpage for the survey, posted the letters, survey forms, and contact information for the solid waste management districts to the webpage, and issued press releases to announce the survey. The Ohio Council of Retail Merchants, The Ohio Manufacturers Association, and Ohio Chamber of Commerce each promoted the survey to its members. Ohio EPA provided this voluntary survey from 2014 to 2017.

Ohio EPA's webpage and each SWMD's individual cover letter and survey directed companies responding to the survey to send the completed survey directly to their SWMDs. Consequently, Ohio EPA doesn't have metrics to demonstrate the effectiveness of the survey effort.

Strategy 3: Study existing curbside recycling programs to determine factors that make curbside programs successful as well as define typical costs and potential participation rates.

In 2010, Ohio EPA coordinated a meeting among representatives from the six most populous cities in Ohio to discuss their curbside recycling services. The purpose of the meeting was to allow the cities to become acquainted with each other's recycling services and to confer about the issues and challenges each city faced. From these interactions, city sanitation managers and solid waste experts developed working relationships and were able to improve their cities' curbside services.

In 2014, Ohio EPA reconvened the representatives from the six cities to share the present and future status of their programs. A secondary purpose was to brainstorm ways the cities could further aid each other in continuing to improve their curbside services.

In 2017, Ohio EPA, in conjunction with The Recycling Partnership, conducted a series of workshops to train SWMDs and local communities on best practices for recycling education and outreach. In total, the Agency and the Partnership provided workshops in Columbus, Akron, Lima, Moraine, and Athens. During the workshops, the Partnership provided its expert advice and national perspective on effective outreach, taught attendees best educational and operational best practices for curbside services and demonstrated how to use the Partnership's customizable education templates. Local SWMDs hosted the regional meetings, and the Organization of Solid Waste Districts of Ohio paid for food and refreshments. In all, 239 attendees representing SWMDs, local communities, private sector waste companies, consultants, non-profit organizations, and others participated in the meetings.

Strategy 4: Publish the Facility Data Report every other year and Solid Waste Management in Ohio – Recycling, Reduction, Waste Generation, and Disposal every three years. In years when full reports are not published, Ohio EPA will make the data used for both reports available.

The facility data report compiles the data reported by Ohio's owners/operators of landfill and transfer facilities in their annual operational reports. The facility data report organizes the data into multiple tables, and each table presents data differently. These different tables display data in various ways to communicate the types, origins, destinations, and amounts of waste accepted at each facility and for Ohio as a whole. For all years since 2009, Ohio EPA has the made the data available through its website

In the past, Ohio EPA periodically published versions of the facility data report that provided a more comprehensive overview of Ohio's waste disposal. These versions contained supporting text to describe trends, provide an overview of available landfill capacity, analyze imports and exports of waste, and detail the flows of waste to facilities. Ohio EPA has not published a full facility data report since the 2009 State Plan was adopted. Feedback from interested parties indicates that the level of effort required to summarize the data and trends is not warranted as the text does not add significant value.

Strategy 5: Ohio EPA and ODNR will work with the Ohio Department of Administrative Services to incorporate recycling services into the service contracts for Ohio's state government agency office buildings.

The Ohio Department of Administration Services (DAS) does not require recycling services to be provided in DAS-managed buildings or in third-party managed buildings that house state agencies. However, in 2014, DAS entered into a ***master services agreement*** with Elytus for refuse pickup and disposal services including recycling. Elytus is a third-party administrator that arranges for waste management services on behalf of state agencies via the terms of the contract.

Strategy 6: Ohio EPA and ODNR will coordinate solid waste planning between both agencies.

As was explained for Strategy 1, the Recycling and Litter Prevention Program was housed at ODNR until 2012. Prior to that, the programs in both agencies regularly interacted with the same entities, but not always in conjunction with one another. Further, the programs dealt with issues of common interest. Despite those similarities, the two programs historically didn't frequently communicate. By the time Ohio EPA was developing the 2009 State Plan, the two agencies had begun working together on common issues. With the 2009 State Plan, the two agencies made a commitment to maintain regular contact.

Now that the Recycling and Litter Prevention Program is housed at Ohio EPA, both programs communicate frequently and work together closely on a variety of projects. Examples include developing priorities for and reviewing the recycling and litter prevention grants, providing outreach and technical assistance, conducting research, implementing special projects, and making field visits.

Strategy 7: Ohio EPA will conduct an annual survey of material recovery facilities (MRFs) and distribute the results of the survey to appropriate SWMDs.

In 2007, to reduce the burden of data collection for SWMDs, Ohio EPA in conjunction with private waste companies launched a voluntary survey effort to obtain data from Ohio's major material recovery facilities. Rather than having to complete surveys from multiple for SWMDs, the owners/operators of the facilities submit their statewide data to Ohio EPA. Ohio EPA then distributes the data to the appropriate SWMDs. Ohio EPA has conducted this survey every year since 2007.

In 2008, Walmart, on its own initiative, submitted data about material recycled at the company's Ohio stores to Ohio EPA. Walmart's willingness to share its data prompted Ohio EPA to reach out to other commercial retailers to request data about their recycling efforts in Ohio. In 2018, Ohio EPA received data from 13 retailers and the United States Post Office. The data the retailers supply comes from a corporate office and is

likely more accurate than data a SWMD receives from an individual store. As with data reported for the MRFs, Ohio EPA compiles the data from the retailers and distributes it to the appropriate SWMDs.

Strategy 8: ODNR and Ohio EPA will continue to investigate and support programs to divert organic materials from disposal in landfill facilities.

Over the last decade, Ohio EPA awarded grants totaling about $4.7 million to 34 applicants to support organics projects in Ohio. That funding represents about 10.6 percent of Ohio EPA's portfolio of funded projects over those 10 years (out of $44.2 million awarded for 998 projects). Examples of projects partially funded through Ohio EPA's grants include:

- In-vessel anaerobic digestors for two composting companies in Franklin County, the Akron Zoo, and for two rehabilitation and correctional institutes;
- Grinders, trommel screens, and other equipment for multiple owners/operators of composting facilities;
- Trucks to transport organics;
- An organics depackaging system for a university;
- Food waste pulpers for a rehabilitation and correctional institute, and;
- Various other equipment for both yard waste and food waste operations.

Strategy 9: To the extent possible, the State will support the development of and facilitate the implementation of technologies that use waste to produce energy. To fulfill this strategy, Ohio EPA will investigate developing rules to govern permitting and operating waste-to-energy facilities. Ohio EPA will further investigate ways of overcoming the environmental regulatory barriers that are discussed in Chapter 10.

Since the 2009 State Plan was adopted, anaerobic digestion has become more commonplace in Ohio for managing organics other than biosolids from treating municipal wastewater. In addition to reducing the volume of waste to be disposed of, anaerobic digestors produce biogas that can be refined and used to generate electricity, heat, and transportation fuel. Therefore, anaerobic digestion is a form of waste-to-energy technology.

In 2019, Ohio was home to 10 anaerobic digestors that are not located at wastewater treatment plants. Because these digestors use solid waste organics as feedstocks, making them solid waste disposal facilities, the solid waste must be managed in accordance with Ohio's solid waste regulations. To avoid having owners/operators of anaerobic digestors obtain multiple permits from Ohio EPA, the Agency opted to coordinate permitting between the surface water and solid waste programs. As a result, the Division of Surface Water (DSW) permits the units and includes conditions in its permits to address proper handling of solid waste.

The major barriers for most waste-to-energy technologies are related to air pollution control requirements rather than solid waste regulations. As a result, this strategy has not been a priority for Ohio EPA.

Strategy 10: Ohio EPA will monitor and evaluate the impacts of landfills in Ohio on greenhouse gas emissions.

Statewide, SWMDs reported that 29.1 percent (4,098,867 tons) of R/C solid waste were reduced/recycled in 2017. In total, Ohio's R/C sector generated 14,107,163 tons of R/C waste statewide. Based on these figures, Ohio EPA used U.S. EPA's WARM tool to determine the average reduction in greenhouse gas emissions, reduction in energy use, and the increases in labor hours. WARM (Waste Reduction Model) is a tool that calculates and totals the GHG emissions, energy savings and economic impacts of baseline and alternative waste management practices, including source reduction, recycling, combustion, composting, anaerobic digestion and landfilling. Ohio's efforts:

- Reduced greenhouse gas emissions by 13,131,192.60 metric tons of carbon dioxide equivalent (MTCO2E) and 3,581,234.35 metric tons of carbon equivalent (MTCE). This is equivalent to:
  - removing 2,787,938 passenger cars from the road;
  - conserving 1,477,573,151 gallons of gasoline; and
  - conserving 547,133,024 cylinders of propane used for home barbeques.
- Reduced energy use by 60,401,912.89 million BTUs. This is equivalent to the energy produced by:
  - 659,322 households;
  - 10,396,198 barrels of oil; and
  - 501,458,853 gallons of gasoline.
- Increased labor hours by 26,673,476.50 hours, which can lead to statewide economic growth. The increased labor hours are equivalent to an increase of $576,654,915.72 in wages and $70,933,952.29 in taxes received.

Overall, the state of Ohio reduced its overall CO2 emissions for the U.S. transportation sector by 0.00737 percent and the U.S. energy sector by 0.00726 percent.

Strategy 11: Ohio EPA will continue to explore ways to reduce fugitive gas emissions and increase Ohio's utilization of landfill gas for energy recovery.

An increasing number of landfill owners/operators collect and process gas from their facilities. This entails various methods such as:

- converting the gas to electricity and selling it to the electrical grid;
- converting gas to compressed natural gas and selling it to clean natural gas (CNG) vehicle fueling stations, and;
- selling cleaned methane to the natural gas grid.

An owner or operator of a landfill can realize the following benefits by recovering gas:

- increase revenue through the sale of processed landfill gas;
- reduce greenhouse gas emissions released into the atmosphere;
- prevent gas from migrating to and collecting in nearby structures and utility corridors; and
- control odors from chemicals, such as hydrogen sulfide, that travel with the migrating gas.

Ohio EPA implemented the following initiatives to reduce fugitive gas emissions:

- Sponsored nationally recognized gas recovery and migration management professional, Jim Walsh of SCS, to be the guest speaker at a statewide DMWM meeting on explosive gas issues in Ohio;
- Developed and implemented statewide explosive gas migration training for all DMWM employees;
- Presented at several regulatory organizations regarding Ohio's current explosive gas issues and efforts to reduce landfill gas emissions;
- Reached out to several trade organizations regarding explosive gas concerns in Ohio, and;
- Revised the current explosive gas regulations to address current landfill gas issues and needs.

Chapter 3: Goals for Solid Waste Reduction, Recycling, Reuse, and Minimization

> The state solid waste management plan shall "Reduce reliance on the use of landfills for management of solid wastes." and "Establish objectives for solid waste reduction, recycling, reuse, and minimization and a schedule for implementing those objectives."

To fulfill the directives of the Ohio Revised Code, this chapter establishes nine required and one optional goal designed to further waste reduction and recycling in Ohio. In their solid waste management plans, SWMDs will demonstrate having strategies and programs to address all the required goals.

This chapter also establishes a statewide solid waste reduction and recycling goal and 11 strategies to be implemented by State of Ohio agencies. These strategies are focused on ways that Ohio agencies can promote recycling and waste minimization and assist Ohio's SWMDs in their efforts at the local level.

Solid Waste Management District Goals

Introduction to Goals 1 and 2

All 10 SWMD goals in this state plan are crucial to furthering solid waste reduction and recycling in Ohio. However, the challenges posed by Goals 1 and 2 typically require SWMDs to devote more resources to achieving those goals than remaining goals. Thus, Goals 1 and 2 are the primary goals of the state plan. SWMDs are encouraged to devote resources to achieving both goals. However, the 52 SWMDs in Ohio vary significantly in their abilities to achieve both goals.

Consequently, SWMDs are not required to demonstrate that they will achieve both goal 1 and 2. Instead, SWMDs have the option of choosing either Goal 1 or Goal 2 for their solid waste management plans. This affords SWMDs with two methods of demonstrating compliance with Ohio's solid waste reduction and recycling goals.

Goal 1: Infrastructure

The SWMD shall ensure that there is adequate infrastructure to give residents and commercial businesses opportunities to recycle solid waste.

To obtain approval from Ohio EPA for its solid waste management plan, a SWMD must demonstrate being able to achieve either Goal 1 or Goal 2 in its solid waste management plan. The criteria for the demonstration, the information needed for the demonstration, and how that information must be presented are prescribed in the District Solid Waste Management Plan Format (Format) prepared by Ohio EPA and in Ohio Administrative Code (OAC) Rule 3745-27-90.

Developing an adequate infrastructure is a necessary first step to diverting waste from landfills to recycling, composting, and other alternate waste management approaches. Infrastructure, in the context of this goal, refers to physical facilities, such as drop-off recycling locations and mixed solid waste materials recovery facilities, and collection systems, such as curbside recycling services.

Goal 1 was originally established in 1995 and has evolved over time. The purpose of the infrastructure goal is to allow SWMDs to devote resources to establishing the basic recycling infrastructure needed to achieve diversion and reduce the difficulties associated with gathering data to measure diversion

The infrastructure goal requires SWMDs to demonstrate that infrastructure adequate to provide at least 80 percent of the residential population in a county with convenient opportunities to recycle exists or will exist. The details of how to demonstrate achieving this goal follow.

Achieving Goal 1

A SWMD that opts to demonstrate compliance with Goal 1 in its solid waste management plan must do the following:

Standard Demonstration

1) Analyze the percentage of the residential population in each county of the SWMD that had the opportunity to recycle using the infrastructure that existed in the reference year.
2) Based on the results of the analysis, the SWMD must demonstrate one of the following (unless the SWMD can demonstrate qualifying for an alternative option below):
    a. Demonstrate that there was adequate infrastructure in the reference year to provide at least 80 percent of the residential population within each county of the SWMD the opportunity to recycle.

       If the SWMD determines that specific recycling opportunities are underutilized, then the SWMD shall develop strategies to increase participation in those opportunities.

    b. Demonstrate that the SWMD will implement new and/or upgraded recycling infrastructure sufficient to provide at least 80 percent of the residential population within each county of the SWMD the opportunity to recycle.

       The SWMD must implement identified recycling opportunities according to a schedule established in the solid waste management plan.

    c. Apply for a waiver from Ohio EPA to provide less than 80 percent of the residential population with opportunities to recycle. The justification for the waiver must clearly delineate why the performance and location of current and planned infrastructure are adequate to achieve Goal 1 and meet the needs of the SWMD without meeting the 80 percent standard. Potential demonstration factors include:
        I. Current or planned recycling drop-offs sites are located on transportation corridors;
        II. Current or planned recycling drop-off sites are located near the border of two political subdivisions within the SWMD to attract residents from both subdivisions to deliver materials to the drop-off;
        III. Recycling drop-off locations are in high traffic shopping areas or other similar locations;
        IV. Current or planned recycling drop-off sites are in areas where curbside service is not currently possible due to cost or other reasons;
        V. Drop-offs are targeted at multi-family residential households; and
        VI. Other demonstrations as provided by the SWMD or required by Ohio EPA.
3) The SWMD must ensure that there will be adequate infrastructure throughout the entire planning period covered by the solid waste management plan to give at least 80 percent of the residential population in each county of the SWMD the opportunity to recycle (unless the SWMD has received a waiver from Ohio EPA for a lower percentage).

Additional Components of the Demonstration

In addition to the previously outlined items, the SWMD must do the following:

1) Demonstrate that the SWMD will meet the applicable standards that are established in the Format for the remainder of the planning period.
2) Calculate the solid waste reduction and recycling rate for the R/C sector. If it achieved less than a 25 percent reduction and recycling rate in the reference year, then the SWMD must demonstrate achieving annual increases in the reduction and recycling rate for the R/C sector.
3) Demonstrate that commercial and institutional generators of solid waste have adequate opportunities to recycle solid waste.
4) Demonstrate that the SWMD will encourage participation in available recycling infrastructure. This can be accomplished through outreach and education programs and through financial incentive programs.
5) Demonstrate that the SWMD will maintain the required infrastructure throughout the entire planning period.

Technical Elements of the Demonstration

Following are various technical elements required for achieving Goal 1. Additional information and details on these and other technical elements are provided in Ohio EPA's Format.

1) Components of the residential infrastructure (curbside programs and drop-off locations) must collect at least five materials from a list specified in the format.
2) The SWMD must demonstrate that the commercial sector has adequate opportunities to collect at least five materials from a list specified in the format.
3) The Format will specify the "credits" for various types of infrastructure. The Format will provide default values for curbside and drop-off programs. Additionally, the Format will provide alternative methodologies of establishing participation in drop-off recycling opportunities. These alternative methodologies will include a "tonnage model" and a survey methodology.
4) The following minimum standards for drop-off locations are used to demonstrate achievement of Goal 1.
    a. Residents can easily find and access the site.
    b. All drop-off sites must provide a minimum of six cubic yards of capacity.
    c. There are signs that are adequate to, at a minimum:
        I. Direct the public to the site or indicates the location of the site;
        II. List the materials that are accepted; and
        III. Provide days and hours of operation (particularly important if the site is not a full-time site that is available 24 hours per day, seven days per week).
    d. The SWMD has made a reasonable attempt to meet the demand of the population for use of the drop-off site (for example, provides collection containers with adequate capacity to handle the use of the site, services the site frequently enough given the use of the site, etc.).
5) "Credit" for infrastructure in a community is limited to the population of an entire community, up to and including the entire credit for a drop-off that would be needed to achieve providing 100 percent of the residential population with access to recycling infrastructure

Goal 2: Waste Reduction and Recycling Rates

The SWMD shall reduce and recycle at least 25 percent of the solid waste generated by the residential/commercial sector.

A SWMD must demonstrate that it will reduce and recycle at least 25 percent of the solid waste generated by the SWMD's R/C sector by the third anniversary of the date the solid waste management plan was approved by Ohio EPA. The demonstration in the SWMD's solid waste management plan must detail all existing and new programs that will allow the SWMD to achieve the 25 percent reduction and recycling rate.

A SWMD must also demonstrate that it will maintain a solid waste reduction and recycling rate of at least 25 percent for the remainder of the planning period covered by the approved solid waste management plan.

Relationship between Goals 1 and 2

Although SWMDs have the option of working toward an infrastructure-oriented goal by providing opportunities to recycle and encouraging participation in available infrastructure, doing so is intended to increase the amount of material being recycled.

Thus, even if a SWMD designates Goal 1 in its solid waste management plan, the SWMD is still expected to make progress toward achieving Goal 2.

A SWMD's ability to achieve Goal 2 is, in part, a direct correlation to achieving Goal 1 that requires adequate recycling infrastructure be implemented. Obtaining quality recycling data is an essential component for the SWMD to determine the current and future recycling and waste reduction occurring within the SWMD and for achieving Goal 1.

Goal 3: Outreach and Education — Minimum Required Programs

The SWMD shall provide the following required programs: a website; a comprehensive resource guide; an inventory of available infrastructure; and a speaker or presenter.

Most SWMDs provide a wide variety of outreach and education resources and activities. To ensure that essential outreach programs are provided consistently statewide, all SWMDs to provide, at a minimum, the following four tools:

Website – The SWMD shall create and maintain a website to provide, at a minimum, basic information about the recycling infrastructure in the SWMD.

Comprehensive Resource Guide – The SWMD shall prepare, regularly update, and make available a compilation of reduction and recycling outlets for specific materials. This guide is intended to be used to provide referrals to interested parties that are looking for alternative management options for specific wastes. For example, the resource guide shall identify where residents and businesses can recycle unwanted items such as clothing, used oil, compact fluorescent bulbs, home renovation items, household hazardous waste, electronic waste, etc.

Infrastructure Inventory – The SWMD shall maintain and make available up-to-date information about the basic solid waste recycling and management infrastructure in the counties that comprise the SWMD. This information shall include, but is not limited to: curbside recycling services; drop-off recycling locations; composting facilities; yard waste collection programs; hauler-provided recycling services; material recovery facilities; and recycling centers.

Speaker/Presenter – The SWMD shall either employ or have readily available someone who can function as a speaker or presenter when needed.

Goal 4: Outreach and Education — Outreach Plan and General Requirements

The SWMD shall provide education, outreach, marketing and technical assistance regarding reduction, recycling, composting, reuse and other alternative waste management methods to identified target audiences using best practices.

Each SWMD will develop an outreach and marketing plan. This outreach and marketing plan will be the SWMD's strategic plan for providing outreach and education.

There are three components that all SWMDs shall incorporate into their outreach and marketing plans. These components are:

1) Each SWMD will address specified target audiences;
2) Each SWMD will follow basic best practices when developing outreach programs; and,
3) Each SWMD will select an outreach priority and provide programs to all appropriate audiences in the context of the priority.

Each of these components is explained below under a heading corresponding to the component. Following these explanations is a discussion regarding developing and selecting programs.

Target Audiences

Each SWMD's outreach and marketing plan will address the following five target audiences:

1) Residents, including those in single and multi-county units;
2) Schools;
3) Industries;
4) Institutions and Commercial Businesses; and
5) Communities and Elected Officials.

The composition of each target audience will be defined in the Format.

A SWMD will have the ability to demonstrate that outreach to a target audience is not needed if that audience does not constitute a significant presence in the SWMD. For example, a SWMD with a limited industrial sector may satisfy that sector's needs with fewer outreach programs in its outreach and marketing plan. A SWMD with multiple counties may have different target audiences in each county depending upon the presence or absence of an audiences in the county.

Best Practices

When selecting programs and strategies to address each audience, the SWMD will adhere to the following best practices:

1) Be familiar with the solid waste management infrastructure.

   Understanding the solid waste management infrastructure, particularly the reduction and recycling infrastructure, is crucial to understanding how outreach can be the most effective.

2) Provide outreach within the context of the infrastructure.

   The central message of the outreach and marketing plan will depend upon the existing infrastructure.

   The goal of the outreach and marketing plan is to increase how much material is diverted from disposal within the SWMD by changing behavior. However, it is not possible for people to divert material if the necessary infrastructure is not available. Thus, if a SWMD lacks infrastructure, then the outreach and education programs should be focused on the audiences that can implement that infrastructure.

   If the SWMD has adequate infrastructure, then the programs should be focused on getting residents, businesses, and institutions to use the infrastructure.

3) Develop and implement outreach effectively by:
   - Having measurable outcomes to achieve;
   - Understanding the different needs of different audiences;
   - Using a consistently and frequently repeated message;
   - Focusing on changing behavior not just creating awareness; and
   - Evaluating the results to determine if the program is achieving the desired outcome.

Outreach Priority

In addition to specifying the programs to be provided for each target audience, SWMDs will select an outreach priority and will provide programs to all appropriate target audiences in the context of the chosen priority.

In the process of developing its solid waste management plan, a SWMD will perform a needs assessment. This needs assessment will lead SWMDs through the process of analyzing the existing solid waste management infrastructure and identifying underserved audiences and/or program weaknesses. Ohio EPA will provide the process for the needs assessment in the Format.

The results of the needs assessment can help the SWMD identify the outreach priority. The outreach priority can be one of the improvements that the SWMD determines it needs to make, a goal that the SWMD wants to achieve, or another priority that the SWMD identifies. The SWMD's outreach and marketing plan will specify the affected audiences and the strategies the SWMD will use to address the priority. The outreach programs will be designed to change the behaviors of the target audiences to accomplish the desired result. The SWMD's outreach priority may change over the planning period of its solid waste management plan.

Developing and Selecting Programs

A SWMD has the option of developing its own outreach programs and selecting programs from a compilation of programs that will be developed by Ohio EPA. This compilation will consist of outreach and education programs that have successfully resulted in changing reduction and recycling behavior. These "model" programs will be programs that have been implemented by other SWMDs in Ohio, and the implementing SWMD has information documenting the success of the program. By providing these programs as models, Ohio EPA has determined that these programs meet the requirements of Goal 4 provided the programs are implemented effectively.

Although model programs can meet the requirements of Goal 4, ensuring success will mean that the SWMD will need to adapt the program to that SWMD's specific, local circumstances.

The purpose of the compilation of model programs is to simplify the solid waste management plan preparation process by giving SWMDs the ability to select proven programs rather than research and develop new programs.

All SWMDs will retain the ability to develop their own outreach programs, and no SWMDs will be required to implement any model programs. Regardless of whether it develops its own programs or selects programs from the compilation of model programs, the SWMD will develop and select programs within the context of the best practices.

Goal 5: Industrial Programs and Services

The SWMD shall incorporate a strategic initiative for the industrial sector into its solid waste management plan.

Each SWMD will make at least three programs, activities, or services available to industrial generators. These programs or activities can consist of recycling services, technical assistance, education, outreach, and other activities selected from a list provided in the solid waste management plan format issued by Ohio EPA as is required by Ohio Revised Code 3734.53(A). A SWMD's solid waste management plan must describe the programs and activities the SWMD will make available and provide a schedule for implementing the programs and activities. Possible services, technical assistance, education, and outreach activities include but are not limited to:

- Waste assessments;
- Assistance with contracting for recycling services;
- Assistance with identifying grants for developing or improving recycling programs and assistance preparing applications for those grants;
- Establishing recycling and waste reduction programs;
- Improving existing recycling programs;
- Collaborating with industries through the Ohio Materials Marketplace;
- Workshops;
- Business roundtables;
- Revolving loan funds to purchase equipment for processing materials for recycling;
- Waste reduction analysis;
- Extended producer responsibility opportunities;
- Industrial recycling cooperatives;
- Collection services; and
- Other programs or activities identified by the SWMD.

Goal 6: Restricted Solid Wastes, Household Hazardous Waste (HHW) and Electronics

The SWMD shall provide strategies for managing scrap tires, yard waste, lead-acid batteries, household hazardous waste and obsolete/end-of-life electronic devices.

SWMDs are required to provide strategies to manage wastes that are restricted from disposal in solid waste facilities.

Scrap tires, yard waste, and lead-acid batteries are the only three solid wastes currently restricted from disposal. In addition, SWMDs are required to provide residents with strategies that address HHW and end of-life/obsolete electronic devices. For more information regarding Ohio's material restrictions, see Chapter 4.

The specific programs and strategies that a SWMD chooses to implement are at the discretion of the SWMD. However, each SWMD must, in its solid waste management plan, demonstrate that it does or will provide programs to address all five wastes listed in this goal. More details regarding the types of programs provided by SWMDs are provided in Chapters 2, 4, 7, and 8.

Goal 7: Economic Incentives

The SWMD shall explore how to incorporate economic incentives into source reduction and recycling programs.

Recycling behavior is heavily influenced by economic incentives and disincentives. For this reason, it is important that SWMDs continue to explore methods of increasing participation through economic incentives or the removal of economic disincentives.

SWMDs are required to evaluate how economic incentives could be incorporated into their programs and activities. While this evaluation will not obligate a SWMD to implement an incentive-based program, it is expected that the information obtained through the evaluation will be considered by the SWMD as it develops future programs.

Examples of financial incentives are volume-based collection rates (Pay-As-You-Throw (PAYT) programs), incentive-based grant programs, rewards for recycling, and other means of reducing direct costs to residents to recycle.

Goal 8: Measure Greenhouse Gas Reduction

The SWMD will use U.S. EPA's Waste Reduction Model (WARM) (or an equivilent model) to evaluate the impact of recycling programs on reducing greenhouse gas emissions.

Greenhouse gases are gases that trap heat in the atmosphere. Some greenhouse gases, such as carbon dioxide, occur naturally and are emitted to the atmosphere through both natural processes and human activities. Other greenhouse gases, such as fluorinated gases, are created and emitted solely through human activities. The principal greenhouse gases that enter the atmosphere because of human activities are:

- Carbon Dioxide (CO2):
- Methane (CH4):
- Nitrous Oxide (N2O):
- Fluorinated Gases.11

Greenhouse gases are generated by activities that support our lives, like using energy, growing food, raising livestock, and managing waste. It is believed that most of the climate change in recent decades is the result of greenhouse gases created by human activities. Greenhouse gas emissions can be minimized through simple measures, including energy saving technologies such as compact fluorescent light bulbs and energy-efficient appliances, proper automobile maintenance, and reducing and recycling waste.

U.S. EPA's WARM is designed to help solid waste management professionals track and voluntarily report reductions in greenhouse gas emissions based on the management practices used for waste (source reduction, recycling, combustion, composting, and landfilling). WARM calculates and totals greenhouse gas emissions based on existing waste management practices ("business as usual" scenario) and implementing alternative waste management practices. Thus, WARM is used to measure the effects on greenhouse emissions by implementing alternative waste management practices.

WARM calculates emissions in metric tons of carbon equivalent (MTCE), metric tons of carbon dioxide equivalent (MTCO2E), and energy units (million BTU) across a wide range of material types commonly found in municipal solid waste (MSW).

SWMDs can use the results of WARM as a tool to promote the benefits of recycling programs as well as to advertise the success of recycling programs.

Goal 9 (optional): Market Development

The SWMD has the option of providing programs to develop markets for recyclable materials and the use of recycled-content materials.

Having adequate demand and strong markets for recyclable materials are widely acknowledged as critical components for the success of recycling programs. "Closing the loop" by purchasing products made from recovered materials creates the strong markets that make providing recycling programs possible.

Many markets for recovered materials are global. Even so, waste management professionals widely recognize that localized efforts to stimulate markets for recovered materials can positively affect those markets at both the local and regional levels. For this reason, SWMDs are encouraged to conduct market development activities to promote the use of recycled products and to develop local markets for recovered materials. However, providing a market development strategy is not a mandatory element of a SWMD's solid waste management plan.

Examples of market development strategies include:

- Compiling and distributing lists of vendors that sell products made from recycled materials;
- Developing policies that favor recycled-content products for government purchasing programs;
- Grant programs for purchasing recycled-content items;
- Grants and loans to businesses that use recovered materials in their processes or products; and
- Funding research and development projects.

For more discussion concerning potential market development activities, please see Chapter 9.

Goal 10: Reporting

The SWMD shall report annually to Ohio EPA regarding implementation of the SWMD's solid waste management plan.

SWMDs shall annually submit an annual district report (ADR) to Ohio EPA on a form that is prescribed by Ohio EPA. Through the ADR, each SWMD shall describe the status of the programs and activities listed in the implementation schedule of the plan and the progress made toward the reduction objectives.

Completing the ADR will require the SWMD to:

a) Provide a detailed report on the status of the ongoing, new and proposed facilities, programs, and activities listed in the implementation schedule of the approved solid waste management plan;
b) Provide an inventory of the alternative management methods available in the SWMD and the types and quantities of municipal solid waste, yard waste, and industrial solid waste managed through alternate methods such as recycling, reuse, or minimization for the year;
c) Identify source reduction activities that occurred during the year;
d) Identify quantities of waste generated in the SWMD that were disposed of at out-of-state landfills;
e) Include copies of revisions or additions to rules adopted under ORC 343.02;
f) Provide an inventory of municipalities and townships that levy a host community fee under ORC 343.01 (G); and
g) Report on the results of a SWMD's special collection events, including the types and quantities of wastes collected, recycled, or disposed of.

State Strategies

Ohio's state agencies will implement the following 11 strategies to help further reuse, reduction, and recycling.

Strategy 1: In collaboration with The Ohio Manufacturers Association, the Ohio Chamber of Commerce and other trade organizations, identify recycling-related programs and services industrial generators need/would like to be offered.

Strategy 2: Ohio EPA will collaborate with The Ohio Manufacturers Association and the Ohio Chamber of Commerce to encourage industrial reuse/recycling from a state level.

Strategy 3: Ohio EPA will evaluate its ability to establish an information clearinghouse for outreach/education resources on the Agency's website.

Strategy 4: Ohio EPA will assist local communities make information about what can/can't be recycled available. In carrying out this strategy, Ohio EPA will focus on using social media.

Strategy 5: Ohio EPA will investigate a procedure to identify new solid wastes, new contaminants, and new recyclable materials that need to be monitored and addressed.

Strategy 6: Ohio EPA will investigate ways of reducing contamination at drop-offs.

Strategy 7: Ohio EPA will include contamination reduction efforts as priorities in the Agency's Recycling and Litter Prevention Grants program.

Strategy 8: Ohio EPA, working with appropriate stakeholders, will investigate the best strategy for providing recycling services to residents in multi-family housing structures. Such a strategy could involve:

- working with property managers, condominium associations, and housing boards to establish and contract for on-site recycling services;
- siting drop-offs in areas with high concentrations of multi-family housing;
- developing a how-to manual for starting a recycling program for multi-family housing, and;
- targeted promotion to residents in multi-family housing about their recycling options.

Strategy 9: Ohio EPA will develop a hierarchy that represents a phased approach for communities to implement recycling programs, services, and education. The first tier of the hierarchy would consist of basics. Each subsequent tier would consist of more advanced activities. The premise is that as a community has experience and resources, it makes continuous improvement by expanding the scope and complexity of available programs.

Strategy 10: Ohio EPA will develop case studies to profile programs for achieving Goal 4. To be profiled, a program must have successfully resulted in changing recycling behavior.

Chapter 4: Restrictions on the Types of Solid Waste Disposed of in Landfills and Burned in Incinerators

> The state solid waste management plan shall "Establish restrictions on the types of solid wastes disposed of by landfilling for which alternative management methods are available, such as yard wastes, and a schedule for implementing those restrictions."

While developing House Bill 592, Ohio's legislature recognized that regulatory-based disposal bans could stimulate Ohioans to develop alternative management options for difficult to manage wastes and materials with the potential for higher end uses. Therefore, the legislature assigned Ohio EPA, working with the Materials Management Advisory Council (MMAC), the authority to use the state plan to restrict specific solid wastes from being disposed in landfills. Ultimately, the intent of implementing bans is to conserve landfill capacity by directing waste away from landfills to uses that capitalize on the waste's value.

This authority combined with MMAC's role in developing markets for recyclable materials give Ohio EPA and MMAC authority to not just ban materials but also create markets for banned materials. By establishing disposal restrictions on wastes and creating markets for those wastes, Ohio EPA and MMAC, through the state plan, can facilitate the flow of restricted wastes to alternative management options.

Existing Restrictions

Ohio's regulations prohibit source-separated yard waste, scrap tires, and lead-acid batteries from being disposed in landfills.

Source-separated yard waste

Ohio's yard waste restriction bans source-separated yard waste from being disposed of in solid waste landfill facilities and burned in incinerator facilities. Source-separated yard waste is yard waste the generator intentionally kept separate from trash so the yard waste could be collected separately. Yard waste mixed with other waste by the generator is not banned from disposal in solid waste landfill facilities. As a result, Ohio's yard waste ban is a partial, not total, ban.

Scrap tires

While there are some exclusions, Ohio's scrap tire restriction bans whole and shredded scrap tires from being disposed of in landfill facilities. Scrap tires can be disposed in dedicated monofills and monocells specifically designed to accept only scrap tires.

Lead-acid batteries

Ohio law prohibits anyone from commingling a used lead-acid battery with solid waste or disposing of a used lead-acid battery at a solid waste facility.

Limitations of restrictions in Ohio

Ohio law grants Ohio EPA the authority to regulate solid waste facilities (landfill, transfer, incinerator, and composting). Those facilities are the last step in the waste management process. Ohio EPA's authority does not extend to generators or transporters of solid waste. Consequently, Ohio EPA cannot require generators to separate specific waste materials from their solid waste or transporters to collect banned materials separate from trash. When generators and transporters have the option of disposing of banned materials with general trash, a restriction cannot be effective[4].

[4] The scrap tire restriction is an exception because Ohio's law gives Ohio EPA the authority to regulate generators, transporters, and facility owners/operators.

The yard waste restriction was Ohio's first attempt to implement a ban on disposing of a specific material. Despite spending significant time and resources developing the ban, the limitations on Ohio's ability to restrict wastes from disposal became an insurmountable obstacle to implementing a full-scale ban. As a result, Ohio EPA changed its philosophy regarding disposal restrictions. This philosophy stresses creating non-regulatory strategies to divert materials from disposal, such as encouraging participation in alternative management programs. This philosophy was incorporated into all subsequent state solid waste management plans.

While this approach does not create a regulatory prohibition on the disposal of specific wastes, it is more workable given Ohio's limitations. Such an approach requires a strong emphasis on providing outreach and education to residents about making long term changes to how waste is managed. Education and outreach programs must also educate residents and community leaders about the need for new recycling infrastructure for specific materials. As the demand and interest for alternative management programs increases, those programs typically become more prevalent.

Ohio EPA will monitor other states' regulations and policies as well as Ohio's recycling infrastructure for indications that additional disposal restrictions could be proposed in Ohio. Given the focus of the current solid waste regulations on solid waste facilities rather than generators and transporters, Ohio EPA does not foresee implementing any new disposal restrictions. In the future, if Ohio EPA's regulatory authority is expanded to encompass at least transporters, then new disposal restrictions could be pursued. Any new restrictions would be evaluated in terms of the volume and hazards associated with the material, the costs and benefits of alternative options, the effect of a disposal restriction on waste management, and availability of an alternative management infrastructure.

Chapter 5: Revised General Criteria for the Location of Solid Waste Facilities

The state solid waste management plan shall "Establish revised general criteria for the location of solid waste facilities."

Prior to 1990, there were few, formally established requirements governing the appropriateness of a site for constructing and operating a solid waste facility. Consequently, many poorly sited landfills threatened human health and the environment. The threats posed by these facilities were compounded by the lack of proper operating practices and engineered controls being incorporated into facility design.

Improperly sited, constructed, and operated disposal facilities were directly responsible for degrading surface, ground, and drinking water supplies. Improperly sited facilities also resulted in the migration of explosive gases through underground paths to nearby structures. Furthermore, improperly sited facilities were hazards to aircraft, threats to neighboring properties, damaged by subsidence of underlying earth materials, incompatible with nearby utility and transportation corridors and causing nuisance conditions. In many instances, expensive, time consuming cleanups were performed to correct the impacts caused by poorly located disposal facilities.

As a result of the factors described above, Ohio's legislature, through House Bill 592, required the state solid waste management plan (state plan) to recommend criteria to restrict where solid waste facilities can be located. Those siting criteria are meant to limit the types of environmental issues caused by existing facilities. Although the siting criteria were meant to address all types of solid waste facilities (landfill, transfer, compost, and incinerator), the focus was on municipal solid waste (MSW) landfill facilities.

House Bill 592 also required Ohio EPA to develop rules governing solid waste disposal facilities. Those rules were to include, among many other requirements, the siting criteria recommended in the state plan. In response, Ohio adopted the initial rules governing solid waste disposal facilities in 1990. During subsequent updates to those rules, Ohio has strengthened the siting criteria. As a result, Ohio now has comprehensive, protective siting criteria that are codified in rule.

In accordance with the Ohio five-year rule review mandate described in Chapter 1, Ohio EPA reviewed the landfill rules in 2014 but did not recommend any changes to the siting criteria. While this version of the state plan was underway, Ohio EPA was performing another five-year review of the landfill rules and had issued a draft version of the municipal solid waste landfill rules for interested party comment. If adopted, those rules would change the siting criteria from applying to the entire facility boundary to applying to sources of pollution (for example, areas of waste placement, areas of leachate storage) within the facility boundary.

Given the comprehensiveness and regular reviews of Ohio's siting criteria, the state solid waste management plan now plays a minor role in influencing the program. For that reason, this version of the state plan defers to the rule development process for any recommendations to siting criteria.

Chapter 6: Management of Ash Resulting from the Burning of Mixed Municipal Solid Waste

> The state solid waste management plan shall "Examine alternative methods for disposal of fly ash and bottom ash resulting from the burning of mixed municipal solid wastes."

When House Bill 592 was passed, Ohio's solid waste management community anticipated that incinerating municipal solid waste would be an important component of Ohio's overall waste management system. Solid waste professionals expected that incinerating MSW would reduce the volume of waste that needed to be disposed. In order to further reduce Ohio's reliance on landfills, Ohio's state solid waste management plan is meant to establish strategies for alternatives to disposing of large quantities of generated ash. The combination of reducing the volume of waste by incinerating it and diverting ash away from landfill disposal was intended to reduce Ohio's reliance on landfills.

Incineration never emerged as a long-term management option for MSW in Ohio. All existing, incinerators that burned mixed municipal solid waste ceased operating by 1997. By 2019, there was only one operating incinerator in Ohio that was licensed to burn solid waste. That facility burns primarily infectious waste with a very small quantity of solid waste.

Given the absence of large, publicly owned municipal solid waste incinerators in Ohio, developing alternative management options for ash is not necessary. Furthermore, Ohio EPA does not expect incinerating MSW to become a viable management option for MSW due to the expense of meeting current air emission standards, the time required to issue a permit to install a new facility, public opposition to solid waste incinerators, and the extensive landfill capacity available throughout the state.

If circumstances change in the future, then Ohio EPA and MMAC will develop a strategy for diverting ash from landfills through the next state solid waste management plan.

Chapter 7: A Statewide Strategy for Managing Scrap Tires

> The state solid waste management plan shall "Establish a statewide strategy for managing scrap tires, which shall include identification of locations within the state that qualify as scrap tire facilities and accumulations. In developing the strategy, the director shall examine the feasibility of recycling or recovering materials or energy from scrap tires and landfilling scrap tires in abandoned coal strip mines as well as other methods for managing scrap tires."

Introduction

When House Bill 592 was passed in June 1988, Ohio lacked a regulatory program to ensure that scrap tires were managed properly. Consequently, many scrap tires were illegally disposed through a combination of open dumping, tire dumps, and large stockpiles accumulated for perceived future value. In fact, for 1987, Ohio EPA estimated that 47 percent of scrap tires were unaccounted for and presumed to be illegally dumped or stored in illegal stockpiles.

To stimulate developing a program to manage scrap tires, Ohio's General Assembly required the state solid waste management plan to establish a strategy for managing scrap tires. The 1989 State Solid Waste Management Plan established the first strategy which included recommendations for a disposal ban, regulating storage sites, investigating disposal in abandoned strip mines, developing markets, abating stockpiles, and investigating energy recovery from scrap tires.

Ohio has a comprehensive scrap tire management regulatory program. Over the 25 years that the program has operated, Ohio EPA has removed more than 400,000 tons of tires from more than 700 illegal scrap tire dumps at an approximate total cost to the state of $66 million. Those 400,000 tons equate to 40,000,000 million passenger tire equivalents (PTEs)[5]. Of those tires, approximately 250,000 tons were removed from the former Kirby Tire Recycling, Inc. That site was not just Ohio's largest but one of the nation's largest, illegal scrap tire sites as well.

In 2006, environmental professionals and the tire industry recognized Ohio's scrap tire program for its outstanding achievement. The National Registry of Environmental Professionals presented its 2006 abatement award to Ohio for the Kirby abatement effort as well as for Ohio's overall cleanup program. The Rubber Manufacturers' Association ranked Ohio's scrap tire program as seventh best program out of the 50 states. Since that time, Ohio has built on its success and continues to develop strategies to not just clean-up illegally managed scrap tires but also to improve proper management of scrap tires through education and outreach.

The State of Ohio's five-year review requirement provides regular opportunities to make needed changes to the program. Given the maturity of and regular updates made to Ohio's scrap tire program, the state solid waste management plan now plays a minor role in influencing the program. For that reason, this chapter summarizes recent developments in and plans for the scrap tire program rather than recommend changes to the program.

Background

To create a regulatory structure for scrap tires, Ohio's 120th General Assembly adopted Senate Bill 165 in 1993. This bill created Ohio's scrap tire law. In 1996, Governor George Voinovich adopted comprehensive rules to implement the law. Those rules, along with subsequent amendments, address all aspects of handling scrap tires, including: transportation; storage; beneficial use; and disposal. Further, as was originally recommended in the

[5] A passenger tire equivalent, or PTE, is the standard unit of measurement used by Ohio EPA to quantify scrap tires. A PTE is equivalent to 20 pounds, the weight of an average passenger tire. PTE is used to convert different types of tires to a common unit of measurement. That helps estimate costs to remediate scrap tire dumps as the weight of tires is more useful than number of tires. For example, it is more expensive to handle a large truck tire than it is a passenger tire. An average semi-truck tire is around 100 pounds, or the equivalent of five passenger tires. Counting the truck tire as five passenger tires accounts for the higher cost of handling it.

1989 State Solid Waste Management Plan, the new scrap tire rules instituted a ban on disposing of scrap tires in landfills[6]. That ban forced Ohioans to find alternative ways to manage scrap tires.

At the beginning of the scrap tire program, a larger percentage of scrap tires were disposed in monofills and monocells than are currently. That was likely due to limited end uses for scrap tires. Historically, the largest use for scrap tires in Ohio has been for civil engineering projects. In 2017, 47 percent of all scrap tires reported were used in civil engineering applications. The next largest uses were tire derived fuel (13 percent) and crumb rubber (eight percent). In all, 73 percent of scrap tires were reused or recycled in some way. Another 12 percent were disposed, and eight percent were being stored.

Administering Ohio's scrap tire program involves enforcing the law and regulations, remediating illegally managed tires, issuing grants to develop markets for tire-derived products, and providing compliance assistance, education and outreach to various audiences. It also involves cooperation among many entities, such as Ohio EPA, health departments, SWMDs, local law enforcement, recycling and litter prevention offices, and private companies.

Funding

Ohio's scrap tire program is funded primarily through revenue from a scrap tire fee. Annual licensing and registration fees supplement that revenue. The scrap tire fee is currently $1 per tire and is collected on all new tires sold by wholesalers or retail dealer. Of that, $0.50 is deposited into Ohio EPA's scrap tire fund and $0.50 goes to the Ohio Department of Agriculture's Soil and Water Conservation Program. Ohio EPA uses its portion of the fee to administer the scrap tire regulatory program, award grants to assist developing markets for scrap tires, and abate scrap tire accumulations. At the time this state plan was prepared, the scrap tire fee was scheduled to sunset (in June 2020), but Ohio EPA was confident that the Ohio General Assembly would renew the fee.

Updates to the scrap tire statute and rules.

Ohio adopted revisions to the scrap tire rules only once since adopting the 2009 State Solid Waste Management Plan. Those revisions were minor and adopted in 2014 through Ohio's mandatory five-year rule review process. The changes consisted primarily of updating outdated references to other rules.

While this state plan was being prepared, Ohio EPA was performing its five-year review of the scrap tire rules. The Agency intended to propose a few changes but anticipated keeping most of the content as currently effective.

Ohio EPA was proposing the following changes:

- Re-organize the scrap tire rules into a new program chapter in OAC 3745-580. This re-organization would involve rescinding the existing scrap tire rules in OAC 3745-27 and promulgating new rules in OAC 3745-580. The current 20 scrap tire rules are lengthy and contain multiple sub-level paragraphs. By re-organizing them, the rules requirements can be better organized and spread out more appropriately over an entire chapter of the Administrative Code.
- Require owners of scrap tire facilities that are excluded from licensing and registration/permitting requirements to secure scrap tires in a way that minimizes theft.
- Remove the requirements that mirror Ohio's Fire Code for excluded scrap tire facilities. Ohio Fire Code requirements will remain in the scrap tire rules for the licensed and registered/permitted scrap tire facilities.

[6] Ohio law allows scrap tires to be disposed in dedicated facilities or portions of solid waste landfills dedicated to scrap tires. Facilities for disposing of scrap tires are called monofills. Monocells are units at solid waste landfills that are used to dispose of only scrap tires.

Scrap Tire Enforcement and Remediation

Ohio has two tracks it uses to clean up illegally managed scrap tires. The first is a traditional enforcement strategy authorized in ORC Section 3734.85(A). The second strategy is a "no fault" scrap tire removal program which allows Ohio EPA to remediate certain scrap tire accumulations without pursuing enforcement.

Enforcement

Ohio law compels Ohio EPA to address illegal accumulations of scrap tires that do not qualify for "no-fault" remediations (see explanation in the following paragraph) through enforcement. That involves exhausting efforts to force responsible parties to clean up scrap tires before spending state funds. The process involves identifying the responsible party, issuing orders requiring that party to remove the tires, using state funds to remove the tires if the responsible party doesn't comply, and seeking cost recovery by placing a lien against the property. Historically, enforcement-related cleanups have constituted the bulk of the more than 40 million tires cleaned up by Ohio EPA.

No Fault/Consensual Cleanups

Ohio Revised Code Section 3734.85(E) allows Ohio EPA to provide tire removal services to a victim of open dumping through state contractors with no cost to the victim. Eligible sites must consist of no less than 100 and no more than 5,000 tires. Further, the victim must demonstrate meeting six criteria established in the law. Among those requirements, the victim must be able to: demonstrate that the tires were dumped after acquiring the property or acquired as a bequest or devise of an estate; be unable to identify the responsible party; and certify that they received no financial benefit from the tires being placed on the property.

From 2016 through 2018, Ohio EPA conducted 159 no-fault clean-ups that cost around $1.3 million and resulted in the clean-up of more than 288,000 scrap tires. During this same time period, almost $3 million was spent on nine enforcement sites which resulted in almost 1.3 million scrap tires cleaned-up.

Grant Programs

Market Development

Ohio EPA administers this grant to support projects that expand or create markets for scrap tire-derived materials and related products. Public agencies, non-profit organizations, and private companies can all apply for grants. Private companies need to partner with a government sponsor. Eligible projects include:

- purchasing equipment to expand or upgrade scrap tire processing and/or manufacturing operations;
- using scrap tire material in civil engineering or construction projects, such as aggregate in drainage systems and backfill at construction sites; and
- incorporating ground tire rubber or recycled asphalt shingles into new paving initiatives.

An applicant can receive a grant of up to $300,000 and must provide a 100 percent cash match. In 2019, Ohio EPA awarded six applicants scrap tire market development grants totaling $977,336. Of those, three applicants will purchase equipment, two will use ground tire rubber in paving projects, and one will install reinforced scrap tire shred walls at a civil engineering project. Since initiating the grant program in 2006, Ohio EPA has awarded 117 grants totally more than $12 million.

Scrap Tire Amnesty and Collection Programs

Ohio EPA provides funding to local government agencies to collect scrap tires from residents and from along roadsides through Community Development and Litter Prevention Grants. A wide range of projects are funded through the Community and Litter Prevention Grant Program, and the grant program is competitive. Applicants seeking money for amnesty collections compete with applicants seeking funding to purchase processing equipment, trucks and carts for curbside recycling services, litter collection programs, and other uses.

Applicants who receive funding to conduct tire amnesty collections are required to charge people who bring tires to events at least $0.50 per tire. In 2018, Ohio EPA awarded 12 tire amnesty grants totaling $291,025.

Mosquito Control Grants

Ohio EPA provides funding to health departments and other public entities for local mosquito control measures. These grants support Ohio's efforts to mitigate the potential for mosquito borne viruses such as Zika, West Nile, and La Cross Encephalitis. Grant funds can be used for: mosquito surveillance; larval control; adult mosquito control; community outreach; and breeding source reduction

Since beginning the mosquito grant program in 2016, Ohio EPA has awarded grants to 202 recipients totaling more than $4.3 million. As with all of Ohio EPA's grant programs, the mosquito control grant program is competitive, and not all applicants receive funding. In 2019, Ohio EPA received requests from 62 applicants for almost $1.1 million and awarded $659,500 to 35 recipients.

Ohio EPA intends to continue all three grant programs provided Ohio EPA continues to receive enough money from the scrap tire fee to support the programs and is authorized to spend the money.

Other Initiatives

Scrap Tire Summit

On March 23, 2016, the Organization of Solid Waste Districts of Ohio (OSWDO) in partnership with the County Commissioners Association of Ohio and Ohio EPA held a Scrap Tire Summit (Summit). The Summit brought together various stakeholders in scrap tire management to discuss ongoing scrap tire management issues. The event was an effort to gather ideas for combatting the persistent problem of illegal tire dumping and to develop sustainable solutions for scrap tire management in Ohio. The goal was to find ways to improve Ohio's existing scrap tire management program rather than replace it.

Participants provided recommendations regarding four main categories: legislation and regulation; enforcement, education, and funding; market development; and new tire management options. The group concluded that increased education, enforcement, and funding combined with legislative changes could provide short-term solutions to reducing open dumping of scrap tires. Ultimately, however, the group agreed that more complex changes will likely be needed to make a greater impact. Further, investments in additional infrastructure to collect and manage scrap tires is needed to create a sustainable scrap tire management system.

Ohio EPA, working with other stakeholders, continues to implement recommendations from the Summit.

Scrap Tire Forum

On Nov. 13, 2018, Ohio EPA organized a meeting as a follow-up to the Summit. This meeting provided a forum for stakeholders to continue the discussions initiated during the Summit. The goals of the forum were: set expectations for continued progress; identify recommendations for managing scrap tire remediation, collection, and processing; and identify potential end markets for scrap tires.

Following the formal agenda, attendees broke out into two groups to brainstorm ideas for continued progress. One group focused on regulations and legislation and the other on education, outreach, and training. Ohio EPA will work with appropriate stakeholders to address as many of the ideas as possible.

Compliance Assistance, Education, and Outreach

One of the conclusions from the Summit was that cleaning-up open dumped scrap tires will continue to be an ongoing financial burden for Ohio EPA and local governments if Ohio cannot identify and curb the behavior that leads to dumping. While participants at the Summit discussed potential contributing factors, many participants agreed that scrap tire generators are significant perpetrators of the ongoing tire dumping problem in Ohio. In response, Ohio EPA has initiated a scrap tire generator education and outreach effort.

The goal of the education and outreach effort is twofold:

- to produce a standard approach to educating and performing outreach to scrap tire generating businesses that can be utilized by Ohio EPA inspectors and partners; and
- to compile an inventory of scrap tire generators for future outreach efforts and compliance monitoring.

Partners in this effort include solid waste management district staff, Ohio EPA inspectors, health department inspectors, and local law enforcement officers.

Following are the proposed steps to achieve this goal:

Scrap Tire Toolkit

Many of Ohio EPA's partners are already performing outreach to scrap tire generators independent of the Agency. The toolkit is designed to be a repository of all resources DMWM has for educating scrap tire generators. Placing the resources in one location will provide Ohio EPA inspectors and partners convenient access to the resources. In addition, the toolkit includes the scrap tire-related enforcement resources available to our partners from Ohio EPA and Ohio Attorney General (AGO).

Develop Standardized and Effective Statewide Approach to Perform Education and Outreach to Scrap Tire Generators

Developing a statewide approach will be primarily based in the methodology espoused by community-based social marketing (CBSM). Aligned with the methodology of CBSM, the activities that will be performed include:

- Surveys - In 2019, Ohio EPA was preparing to launch surveys designed to learn what prevents and motivates businesses that generate scrap tires to comply with Ohio's regulations. Ohio EPA intended to survey both owners of businesses that generate scrap tires and the Agency's partners that regulate scrap tire generators.

  The survey to Ohio EPA's partners is designed to solicit their understanding of reasons why scrap tire generators may not manage their scrap tires legally. Further, the survey is designed to capture those partners' professional opinions on potential solutions to the open dumping problem in Ohio.

- Convene workgroup – Ohio EPA will convene a group of partners to evaluate the surveys and identify the barriers and benefits to complying with Ohio EPA's scrap tire regulations for scrap tire generators. Most importantly, this group will develop a strategy for providing education and outreach to STGBs that will be piloted through a grant program. During the grant program, the strategy will be tweaked based on compliance monitoring and annual data results.

- Two-year pilot grant program – Ohio EPA will provide grant funding to pilot the strategy. Priority will be given to locations throughout the state that are high risk areas and where STGB inspections are not economically feasible.

Once Ohio's outreach and education strategy is finalized, Ohio EPA will promote it for statewide adoption. Ohio EPA will continue to evaluate the strategy, the need to continuously update the inventory of scrap tire generators, and the need to fund education and outreach through Ohio's scrap tire grant program.

Summary

While Ohio has realized many successes with managing scrap tires, problems remain. The market for recycled tires is not nearly as diverse or robust as it could be. Further despite a system that is designed to manage scrap tires from cradle to grave, illegal tire dumping remains persistent and widespread. Consequently, Ohio EPA and local governments spend millions of dollars annually investigating and cleaning up scrap tires. Ohio EPA will continue working with stakeholders to deter ongoing illegal dumping through a combination of regulatory and educational strategies.

Chapter 8: A Program for Managing Household Hazardous Waste

Ohio Revised Code Section 3734.50(H) requires the state solid waste management plan to "Establish a program for the proper separation and disposal of hazardous waste generated by households."

Hazardous waste generated by households is referred to as household hazardous waste, or HHW. HHW includes any material discarded from a home that, because of the material's chemical nature, may pose a threat to human health and the environment when handled incorrectly. Common household products that can be hazardous waste include:

- household cleaners;
- automotive fluids such as antifreeze, gasoline, and oil;
- lawn and garden products, such as pesticides, fertilizers, and weed killers;
- paint and paint-related products, such as oil-based paint, paint stripper, stains, and turpentine;
- pool chemicals;
- electronics
- fluorescent light bulbs;
- Items that contain mercury, like thermometers and thermostats;
- photographic chemicals; and
- compressed gas tanks (such as propane tanks).

How is HHW Regulated?

Although it can have many of the same properties as industrial hazardous waste, HHW is not regulated under either the federal or Ohio hazardous waste regulations due to the amount generated by each household. Furthermore, it is not practical for Ohio EPA to regulate every household in Ohio. Hazardous waste generated by households can be disposed of along with all other trash as municipal solid waste (MSW). That doesn't mean disposal is the best option; it just means that disposal is not prohibited for households. Thus, Ohio's solid waste professionals encourage homeowners still to manage HHW responsibly.

Even though each household generates only a small amount of hazardous waste, the cumulative effects of HHW can still harm the environment. That same waste, if generated by a business, an institution, or any organization other than a household, would likely be regulated as a hazardous waste, and management of the waste would need to occur through a hazardous waste treatment, storage, or disposal facility. Thus, it is important that homeowners find alternatives to creating and disposing of HHW whenever possible.

Solid Waste Management District Programs for Addressing HHW

Ohio's solid waste statute requires the state plan to contain a strategy for managing HHW. In turn, the state plan requires each of Ohio's 52 SWMDs to provide a strategy for addressing HHW. Because the state plan does not prescribe the strategies that must be provided, SWMDs have maximum flexibility for determining which strategies are the most appropriate for their individual circumstances and their residents. Thus, the programs offered by SWMDs range from education and outreach programs to full scale collection programs.

Education and Outreach

Education and outreach are powerful tools that SWMDs can use not only to change a homeowner's use of hazardous products but also to direct a homeowner to proper management options for HHW. Consequently, a comprehensive education and outreach program addresses all aspects of HHW generation and management.

The best management alternative for HHW is to avoid generating it. A well-rounded HHW education and outreach program provides information about the dangers associated with using products that contain hazardous chemicals, the proper way to use and store those products, and the importance of purchasing and using only the amount of a product that is needed. It is also important to provide homeowners with recommendations for non-hazardous alternatives to dangerous products. Greater public awareness about the purchase, dangers, and use of products that contain hazardous substances enables the consumer to make informed decisions regarding the products they choose. This can lead to a reduced reliance on hazardous products and less HHW that must be managed.

Regardless of how comprehensive a SWMD's prevention education program is, residents are going to generate HHW. The goal is to direct the HHW to the safest and most appropriate management technique. Therefore, while a SWMD's outreach program should provide information on all management options, the SWMD should emphasize options to divert HHW from landfills.

Collection Programs

SWMDs are not required to provide collection programs for HHW, or any material, to their residents. However, more than half of Ohio's SWMDs do provide some form of HHW collection program.

HHW collection programs range from single-material drop-offs to full-scale, permanent collection options. Some SWMDs provide more than one type of collection option, and some SWMDs collect other materials, such as scrap tires, appliances, and electronics, along with HHW. Several SWMDs provide collection programs at recycling centers owned and operated by the SWMDs.

Permanent and Semi-Permanent General HHW Collection Programs

A permanent general HHW collection program is one that is available to residents all year long, at least during regular business hours. A semi-permanent general collection program is one that is available to residents on an extended basis (weekly, monthly, and/or seasonally). These programs are available more regularly than temporary collection events to make managing HHW more convenient for residents.

Temporary, General Collection Events

Historically, most SWMDs hold temporary general collection events, usually on an annual basis. Most often, temporary collection events last for one day on a weekend and are held at a county-owned property or facility, such as fairgrounds. Some SWMDs offer more than one, single day collection event each year. Still others provide collection events over two or more consecutive days.

HHW Drop-offs and Miscellaneous Collection Programs

Several SWMDs provide collection opportunities for limited wastes. Many of these opportunities are drop-off programs. However, several SWMDs also sponsor or coordinate collection events for specific, targeted wastes.

A drop-off is a location where, during designated times, residents can deliver specified waste for a qualified service provider to manage appropriately. SWMDs partner with other entities to provide many of these drop-off locations. Residents are then able to take HHW to the drop-off during the operating hours of the partnering entity. Typical locations for HHW drop-offs include government buildings, libraries, schools, health departments, retail establishments, and SWMD-operated recycling centers.

Conclusion

While Ohio EPA and SWMDs encourage residents to minimize the amount of HHW they generate, homeowners continue to produce it. A SWMD is in the best position to identify and provide the appropriate strategy for addressing residential HHW disposal strategies. Therefore, the state plan continues to advocate that each SWMD have complete autonomy to determine how to best provide its residents with information and collection opportunities.

Chapter 9: Recycling Market Development

> The state solid waste management plan shall "Establish a strategy that contains specific recommendations for legislative and administrative action to promote markets for products containing recycled materials generally and for promoting the use by state governments of products containing recycled materials."

Having adequate demand for recyclable materials is widely acknowledged as a critical component for the success of recycling programs. Strong demand translates into strong markets and higher prices paid for recovered materials. Higher prices increase the economic incentive for collecting materials, stimulate investment by private waste companies in improved processing and collection systems, and may lead private companies to more aggressively expand their customer bases. Strong demand and markets also make creating and expanding residential recycling services more attractive as the net costs associated with these programs decrease due to the increased return on the collected materials. The same dynamics make recycling more attractive for commercial and industrial generators of waste. Ultimately, strong demand for recyclable materials results in the high value of those materials as well as improved economic return and lower costs associated with recycling activities. These factors make recycling a more attractive choice when compared to the alternative management option – disposing of the materials in landfills.

Materials Management Advisory Council Subcommittee

Establishing a market development strategy for Ohio is one of the functions of the state plan that is especially relevant to the State's recycling industry. This is particularly true given the pressures facing the recycling industry, as were discussed in Chapter 1. For this reason, the Materials Management Advisory Committee (MMAC) established a subcommittee of members to develop a market development strategy for this solid waste management plan.

The subcommittee met four times from May to June 2019. Between meetings, members and Ohio EPA contacted representatives from a variety of organizations to identify barriers to and opportunities for improving recovery of scrap tires, obsolete electronics, glass, organics (with a focus on food waste), plastics, wood, and fiber.

Organizations contacted included:

- The Ohio State University's Sustainability Institute
- Flexible Pavements of Ohio
- Ohio Department of Transportation
- Cleanlites Recycling
- Kurtz Bros.
- JobsOhio
- Rumpke
- Innovate Ohio
- Ohio Association of Foodbanks

Based on the research, the subcommittee agreed to focus the market development strategy on organics, glass, plastic, and fiber. In alignment with the waste management hierarchy, reducing the amount of material generated is the ultimate priority. However, this chapter is focused on improving management options for material that is generated through improving markets for that material.

Through its research, the subcommittee found that the barriers to increased recovery/use of all materials fell into three general categories: economic; regulatory; and logistic. While Ohio law gives Ohio EPA and MMAC the authority to recommend legislative actions to overcome barriers, this update focuses on overcoming the economic and logistic barriers. This chapter does not capture the regulatory barriers. During a future update, Ohio EPA and MMAC have the option of looking into regulatory solutions to barriers.

The following are barriers to recovering material that are common to all selected materials:

- low cost of landfill disposal;
- contamination, and;
- inadequate infrastructure

Despite the commonalities of these barriers, there are nuances as to how the barriers impact a specific material. Therefore, rather than provide general descriptions of those barriers, this chapter explains the barriers in the context of each material.

If implemented, some of the opportunities identified in this chapter will overcome barriers for several targeted materials. Examples are reducing contaminants in residential recyclables and improved processing capabilities at material recovery facilities (MRFs).

Markets for New Materials

Some manufacturers in Ohio need recovered materials that are not collected through typical recycling services. An example is polypropylene (labeled 5). Those atypical materials provide opportunities for Ohio to increase recovery and satisfy market demands. Before collectors and processors can begin handling new materials, Ohio needs to improve the quality of the material already collected as the standard material mix. That means limiting the types of materials accepted through recycling services until material collected is cleaner. Currently, polypropylene is a contaminant in residential collection services. Once Ohio's recyclables are cleaner, processors would need to evaluate their abilities to accept an expanded material mix and what equipment might be needed.

MRF Study

Upgrading MRFs with state-of-the-art sorting equipment could improve the quality of Ohio's recovered glass, plastics, and fiber. To identify which regions of the state and which MRFs would best benefit from upgraded equipment, Ohio EPA will investigate issuing a request for proposal (RFP) to conduct a study of Ohio's MRFs. Ohio EPA can provide some of the funding needed to accomplish those upgrades through the recycling and litter prevention grants. Ultimately, making capital purchases to upgrade MRFs will likely require leveraging funding from several public and private entities.

Material Discussions

Food Waste

According to the United States Department of Agriculture's Economic Research Service (USDA), the United States wastes between 30 to 40 percent of the its food supply. Further, USDA found that food waste is the single largest waste stream being disposed of in landfills. Given that there are many families in need of food, this loss is a missed societal opportunity for assistance. It also is a loss of significant economic value.

In 2015, the U. S. EPA adopted a goal of reducing food waste by 50 percent by 2030. While Ohio has not adopted a food waste reduction goal, generators of food waste continue to look for alternative outlets for their waste. This is true for large generators, such as manufacturers, to smaller generators such as businesses with cafeterias. There is an opportunity for Ohio to capitalize on that interest by supporting alternative outlets for both usable and unusable food.

There are two primary outlets for food waste (other than disposal in a landfill) – redistribution of usable food and composting unusable food. Food banks are constantly in need of more usable food to increase service to people who are in need. However, getting usable food to those food banks is complicated.

Unusable food waste can be turned into a value-added product, but only if the material is clean and consistently available. The largest portion of food waste that is disposed is generated by homeowners and commercial

businesses, like grocery stores and restaurants. At the same time, those groups are the most difficult to collect food waste from.

Food Rescue/Redistribution

Barriers:

Food rescue and redistribution organizations face many barriers that limit their abilities to use recovered food. Some of those barriers are related to markets, but many, such as food safety standards, are not. Ohio's market development strategy is focused on barriers the state can address.

Economic

Costs of equipment – Lack of needed equipment is a key barrier that prevents food banks from accepting and distributing more usable food. Food rescue groups and food banks need more refrigeration and freezing capacity to store usable food. Having walk in refrigerators and flash freezers and would allow food banks to increase the amount of perishable food they can save and distribute. However, those freezers are expensive, and most food banks lack the financial resources to purchase them.

Disposing of expired and unsafe food - Food banks receive perishables and donated food that is close to expiring. Without the ability to stabilize or distribute this food quickly, food banks must dispose of spoiled food. Paying associated disposal costs consumes funds the food banks could apply to maximizing their services.

Transportation costs – Food banks incur costs to both collect food donations and distribute food to clients. Some food banks rely on food rescue organizations to collect donations and others use their own trucks and drivers. Many food banks have large geographical service areas. Consequently, food banks spend large portions of their budgets on freight and distribution. Compounding the cost of distribution, trucks are expensive which prevents many from acquiring adequate transportation capacity. Having more trucks would allow food banks and rescue groups to collect and deliver perishable foods faster.

Logistic

Perishability of food – Food banks receive perishable food that is near or past the expiration date. Perishable foods, like fresh produce and dairy products, are the most difficult to manage and the most likely to perish before the food bank can distribute them. Those foods are also some of the most needed by clients.

Inadequate storage space – As was discussed under economic barriers, the lack of storage space is one of the biggest barriers food banks face particularly for saving and distributing perishable foods.

Lack of pick-up service providers and coordinating collecting donations – Some generators of significant food waste (for example, farmers) have limited time and ability to coordinate donating food to food banks and lack the ability to deliver food. To take advantage of surplus, damaged, or disfigured crops, food rescue operations must take the initiative to maintain contact with and make regular collections from farmers.

Other generators, such as grocery stores, have rapid turnover of perishable food and limited space to store that food. To participate in a donation program, retailers need frequent and reliable collection of unsold food.

Opportunities

Even though residential sources are the largest contributors to food waste, Ohio has limited ability to influence diverting that waste to alternative outlets. Therefore, this state plan is focused on markets for usable and compostable food waste from commercial and institutional generators. The food recovery industry could overcome many of its market-based barriers with equipment and enhanced transportation.

Short-Term

Explore incorporating equipment for food waste recovery in the eligibility requirements for Ohio's recycling and litter prevention grants for the following:

- Vehicles for food rescue organizations to collect usable food and deliver it to food banks.
- Equipment for food banks to store food, particularly perishable food.
- Equipment for companies to make products from rescued foods (such as animal feed or dehydrate food).

Long-Term

- *Develop a transportation network* - Ohio EPA will work with food rescue organizations and other relevant stakeholders to explore what it would take to develop a transportation network for collecting and delivering usable food to food banks.
- *Leverage financial resources* - Ohio EPA will explore combining its financial resources with those from other state and public agencies.

Food Waste Composting

Unusable food waste can be turned into a value-added product provided the costs of doing so aren't higher than the value of the finished compost.

Barriers

Economic

Costs to the generator – Generators incur expenses to keep organics separate from trash. These expenses include:

- Continuously educating staff on proper separation;
- Staff time to separate compostables from trash;
- Providing containers to store separated material;
- Transporting compostables to a facility; and
- Fees a collection company and at the composting facility.

Low cost of landfills - It is less expensive to dispose of material in a landfill facility than it is to compost it. This makes it difficult for owners/operators of compost facilities to charge a fee that competes with landfill disposal costs while allowing them to cover the costs of constructing and operating the facility.

Cost of permitting, constructing and operating a composting facility - To compensate for the costs of preparing a permit application, providing financial assurance, purchasing equipment, sampling and testing finished compost, and ongoing operational expenses, facility operators must charge fees to accept material. Those fees must be competitive with Ohio's low landfill prices to encourage generators to take compostables to composting facilities.

Collection service providers - Collecting organics, particularly from multiple, small generators that may not be physically near each other, can be costly and time consuming.

Controlling contamination at compost facilities - Owners/operators of composting facilities incur costs to monitor material being brought to a facility, remove contaminants, and dispose of contaminants and other non-compostables. Those costs increase the overall cost of operating the facility and affect the prices the owner/operator charges for both using the facility and for purchasing finished compost.

Logistic

Material quality – Owners/operators of composting facilities have low acceptable contamination thresholds for incoming material. It is difficult to get generators to eliminate contaminants from the material delivered to the facility.

Lack of facilities – Ohio has a limited number of publicly available, class 2 facilities for composting food waste.

Siting class 2 composting facilities - It can be difficult to find a site that complies with Ohio's regulatory requirements (such as siting criteria and site characteristics), is far enough from populated areas to avoid nuisance conditions, is zoned appropriately, and is central to the service area.

Capturing residential material - The volume of residential food waste is much greater than any other source. However, it is difficult and expensive to collect from households and, if collected, it is likely that residential food waste will be highly contaminated. For that reason, most owners/operators of compost facilities are not willing to accept residential material.

Many communities don't separate organics from trash which is a missed opportunity. However, providing containers, paying a service provider, and educating residents on proper separation are expensive. Many communities may not have the capability to finance the service.

Opportunities

Short-Term

Continue to support purchasing equipment for composting facilities - Helping to finance equipment for class 2 composting facilities and anaerobic digestors could help improve Ohio's infrastructure for managing unusable food waste.

Long-Term

- *Assist potential owners/operators identify acceptable sites for composting facilities* - Ohio EPA could take a more active role in helping people interested in opening a class 2 composting facility identify potential sites. One option is working with Ohio's brownfield revitalization program to identify acceptable locations for sites. When an operator proposes opening a new site, Ohio EPA could then recommend identified brownfield sites as options.
- *Financial support for composting facilities* - Ohio EPA will explore opportunities to collaborate with other Ohio agencies that administer grant and loan programs to better leverage available funding.

Accompanying education and outreach opportunities

While influencing markets is the focus of this chapter, there are opportunities for Ohio EPA to further food waste prevention and recovery through education, outreach, and technical assistance. These efforts can complement Ohio's market development strategies.

- Develop audit protocol - Ohio EPA will investigate developing an audit protocol for businesses that generate food waste.
- Provide public education - Ohio EPA will investigate communication vehicles it can use to distribute information about food waste prevention and recovery. This strategy could involve upgrading the Agency's food waste webpage, using the Agency's social media accounts, and developing literature for distribution.

Other stakeholders have initiated efforts to address food waste. Ohio EPA may be able to build on those efforts. Below are summaries of two recent initiatives:

Ohio Food Scrap Recovery Network (Network) - This initiative began as a collaborative effort among the Ohio Grocers Association (OGA), the Ohio Grocers Foundation (OGF), and the State of Ohio to develop a guide for recycling organic waste. That guide, the Composting and Diversion Guide, waste published in 2009. The guide provides a format for Ohio supermarkets to develop and implement food waste collection programs.

The collaboration on the guide led the OGA and the OGF, along with their members, to continue making progress on recovering food waste through the Network. The Network's objective is to implement a managed supply chain concept by which food scrap generators (grocery stores, restaurants, schools, hospitals and other high food scrap generators) work together to create route density for cost-effective food scrap collection and recycling.

The Network is an opportunity for Ohio EPA to work with OGA, OGF, food waste generators and food recovery entities on improving the food waste management system in Ohio.

Central Ohio Food Waste Initiative (COFWI) - This initiative is a collaborative effort among a variety of stakeholders in food waste recovery and management to develop a long-term solution to reduce and repurpose food waste in central Ohio. The Solid Waste Authority of Central Ohio (SWACO) formed COFWI in 2018 and facilitated meetings among the stakeholders to develop a strategy for addressing food waste. The outcome of these meetings was the Central Ohio Food Waste Action Plan. That plan is COFWI's roadmap for taking advantage of opportunities and developing programs to prevent food waste, rescue and redistribute usable food, and compost unusable food.

Ohio EPA will identify opportunities to build upon COFWI's progress by facilitating efforts in other regions of the state to develop similar strategies.

Glass

Despite it being one of the most recyclable materials and one that can be recycled in perpetuity, a low percentage of container glass generated in Ohio is recovered. Ohio manufacturers of glass products, particularly container glass and fiber glass, have expressed their need to source more recovered glass cullet from within Ohio. Currently, much of the glass cullet those manufacturers use comes from plate glass. Manufacturers and other suppliers of plate glass provide a homogenous, clean product that can be converted to usable material easily making the resulting cullet affordable. However, there is a finite supply of plate glass, most of which is already recovered.

If recovered and sorted properly, container glass from residential and commercial sources could satisfy much of the manufacturers' needs for recovered glass. For the glass to be usable, it must meet manufacturers' quality standards for contamination, color, and particle size. Further, each industry has different standards. Glass recovered through single-stream residential collection services typically is contaminated with materials like organics and ceramics that are difficult to remove through most processing operations. As a result, a large amount of recovered glass is disposed due to contamination. Most processors can't supply single colored glass cullet and don't have equipment to refine cullet to meet manufacturers' particle size standards.

Ultimately, the low value of glass as a commodity and the high cost of providing recovered glass cullet that meets manufacturers' quality standards create a gap between the supply of and demand for glass.

Barriers

Economic:

Low value of glass - The cleaner recovered glass is, the more value it has. Even so, all recovered glass has a low value as a commodity. That renders end uses that require more than basic processing or transportation over long distances cost prohibitive. In the past, recycling glass was at best cost neutral, and revenue from other materials subsidized it. Currently, the low values of most recovered materials no longer offset the costs of processing glass from residential recycling services. That reality makes the cost of recycling glass harder to justify.

The low value of glass has created a paradox in Ohio. Manufacturers want to incorporate more recycled glass in their products. At the same time, communities and processors are dropping or considering dropping glass from their collection mixes.

Low cost of virgin materials - The low cost of virgin materials for manufacturing glass makes it difficult for recovered glass cullet to compete as a feedstock. The more times recovered glass is handled, the higher the price per unit becomes. Ultimately, for the recovered glass market to be successful, the market price for it must increase. This could occur if Ohio's manufacturers pay more for recovered cullet despite the low cost of virgin material. A better commodity price might result in more investments in collection, transportation, and processing for glass and in turn result in more available supply.

Low cost of disposal in Ohio - Further compounding the economics of glass recovery are Ohio's low landfill tipping prices. Those low prices limit incentives for recovering more glass.

Glass processing facilities require large capital investments - Owners and operators of processing facilities need sophisticated processing equipment to produce glass cullet that meets manufacturers' specifications. That equipment is expensive, and processors may not be able to afford the investment or are wary of making the investment if they can't sell the glass cullet at a profit.

Logistic

Contamination - Glass recovered from single stream collection systems typically is contaminated with materials that limit the marketability of recovered glass cullet. This is due to the contamination in commingled recyclables and how glass is removed from single stream recyclables. Most glass is broken while being collected and processed. Broken glass, along with other fines, are removed via a screening process. It is the other fines that contaminate the glass. To make it marketable, the glass must be separated from the fines. This can be done only through a secondary, costly processing system designed specifically for glass.

Damage to sorting equipment - Glass, particularly broken glass, damages sorting equipment leading to higher maintenance costs and lower operating life.

Transporting glass - Glass is heavy which makes it expensive to transport over long distances. Therefore, unless the supply of glass is close to companies that can use the glass, there are regional deserts for glass recovery in Ohio.

Regional processing deficiencies - Northeastern Ohio lacks adequate glass processing capacity. Also, Ohio's major consumers of glass and the processing facility most capable of meeting those consumers' standards are in western Ohio. Those consumers are actively seeking new supplies of recovered glass cullet, and northeastern Ohio could supply a large portion of that need. However, transporting glass from northeastern Ohio is cost prohibitive which eliminates western Ohio as an outlet for glass recovered in northeastern Ohio.

Opportunities

Short-Term

Establish glass-only drop-offs - These drop-offs could be designed to collect all glass colors as one mix or separately by color. Separating glass from other materials at the source could yield higher quality glass cullet and reduce how much residual glass is disposed.

Dedicated bar and restaurant collection system - Bars and restaurants generate large volumes of glass that can be collected separate from other trash. Those establishments could be serviced through an existing single stream recycling route or as a separate glass collection route. Either way, the material would need to be delivered or transferred to a facility for further processing.

Several SWMDs and communities have implemented programs that target glass from bars and restaurants. While those programs help local glass recovery, a statewide effort to capture glass is needed to provide even a portion of the glass needed by Ohio manufacturers.

Funding through Ohio EPA's recycling and litter prevention grants - Glass has long been and will continue to be one of Ohio EPA's priorities for its recycling and litter prevention grants. The Agency continues to award grants for local glass collection programs. Ohio EPA will investigate making equipment for companies to operate collection routes a priority for market development grants.

Expand existing processors' abilities to process glass - Ohio is home to several regional MRFs that have large service areas. The owners/operators of those MRFs can request funding through Ohio's market development grant program to help purchase the equipment needed to increase their glass processing capacities.

Long-Term

Convene a subcommittee to develop a long-term strategy for addressing markets for glass in Ohio - Ohio EPA could facilitate the subcommittee. Stakeholders could include MMAC, Ohio agencies, private waste companies, glass manufacturers, solid waste management districts, and any relevant associations.

Develop new processing facilities for glass - Northeastern Ohio is the most obvious choice to locate a new glass facility. That facility could be either a full-scale processing facility or a depot with limited processing capability and transfer operations. The operator of the depot would do limited processing of the glass to remove as much contamination as possible. The glass would then be consolidated into semi-trucks and transported to the glass MRF in western Ohio for additional processing. A regional processing facility or depot would reduce local recycling service providers' transportation and service costs. Those lower costs theoretically would encourage more service providers to include glass in their collection mixes.

Regardless of which type of facility is best, establishing it would require significant financial investment in equipment. It provides an opportunity for collaboration among state and local governments and private manufacturing and waste management companies. Ohio EPA will facilitate discussions among interested parties as appropriate.

Plastics

Consumer product companies in Ohio have established corporate goals for increasing the content of recovered plastics in their products. This is especially true for companies that manufacture consumer product packaging and companies that distribute their products in plastic packaging. To achieve their goals, companies need larger quantities of clean recovered plastics, and the current supply is not adequate to satisfy those companies' needs.

The type of packaging a company produces dictates the type of recovered plastic the company can incorporate as a feedstock. Manufacturers need constant, adequate, homogenous supplies of that recovered plastic feedstock. That plastic may or may not currently be recovered, be recovered in enough volume, or be a clean enough feedstock. Also, the diversity in chemical composition and color make many plastic resins incompatible, even within a plastic grade, such as PET. Contamination above an acceptable limit can affect the integrity of the manufacturer's product. Finally, the standards for some plastic packaging make incorporating recovered plastic difficult, such as packaging for food contact.

The largest potential supply of unrecovered plastics is post-consumer, single use plastics. Those plastics are also the most difficult to recover, the most diverse, and the most difficult to sort according to grade. Further, many plastics cannot be used as feedstock to make the same type of plastic or same item (such as food contact plastics). Thus, many recovered post-consumer plastics are used to make lower-quality plastic products or incorporated into products which cannot be recycled.

Further complicating plastics recovery, residents are typically confused about what plastics they can and can't recycle through available recycling services. That is due to a number of factors, including a lack of education about acceptable and unacceptable recyclables, a lack of consistent messaging about acceptable materials, differences in collection mixes among communities and service providers, a desire to recycle as much as possible, and confusion over the codes on the bottom of plastic items. The result is that many residents recycle more plastics than they should.

Barriers

Economic

Low values of recovered post-consumer plastics and virgin resins - The low market value of recovered plastics, high contamination rates, costs of processing mixed plastics, and low cost of virgin resins make it hard for companies that process recovered plastics to set prices that compete with virgin materials.

Logistic

Costs of contamination - Although most service providers advertise collecting only PET and HDPE bottles, residents mistakenly place other plastic items in recycling receptacles. Owners/operators of processing facilities must pay to dispose of unacceptable plastics that are removed during sorting which increases the cost of processing. Unacceptable plastics not removed during sorting contaminate bales of plastics which reduces their value.

Inadequate supply of recovered plastics - Low recovery rates and contamination result in an inadequate supply of plastics to satisfy companies' demands for it. This is true even for PET and HDPE bottles which are the most widely accepted through recycling services.

Limitations on plastic grades collected through residential recycling services - Most processors limit acceptable plastics to PET and HDPE bottles. The lack of a collection infrastructure for other plastics limits the supply of recovered plastics manufacturers in Ohio may need.

Lack of knowledge about the supply of plastics in Ohio - Ohio lacks a source inventory of recovered and recoverable pre- and post-consumer plastics. This hinders the State's ability to help source recovered plastics to companies throughout the state.

Opportunities

Short-Term

Diversify grant funding - Ohio EPA will evaluate prioritizing awarding recycling market development grants to companies that use non-traditional, difficult to recycle or underused plastics.

Develop inventory of plastic sources - Knowing the State's available supplies of plastics would allow Ohio agencies to assist new companies looking to locate in Ohio. Ohio could also use the inventory to help existing companies acquire larger quantities of recovered plastics. Ohio EPA and JobsOhio discussed working together to develop that inventory. JobsOhio would focus on identifying pre-consumer sources of waste plastic by type and which of those sources are and are not being recovered. Ohio EPA would identify post-consumer sources, including the landfills and transfer facilities that receive the largest quantities of plastics, which MRFs process the largest quantities and grades of plastic, and the infrastructure for recovering residential plastics.

Long-Term

Dedicated plastics processing facility - Mixed plastics are difficult to sort into specific grades that can meet manufacturers' acceptable contamination limits. That difficulty is compounded when plastics are commingled with other recyclables in a single stream system. A dedicated sorting facility equipped with optical sorting technology could separate mixed plastics by grade more efficiently and effectively than

traditional sorting techniques. The facility could serve as a hub for loads of commingled plastics sorted from single stream recyclables by other MRFs. The commingled loads would then be separated into individual plastic grades at the dedicated plastics facility.

As with glass processing, equipment for processing plastics is expensive. Establishing a dedicated plastics recovery facility is an opportunity for state and local governments and private manufacturing and waste management companies to collaborate on both funding and operating the facility. Ohio EPA will gauge interest among private waste companies, solid waste management districts, and local governments for a plastics MRF. If enough interest exists, then Ohio EPA will facilitate establishing the facility to the extent possible.

Accompanying education and outreach opportunities

Educate residents about recycling plastics - Residents either receive limited or conflicting information about proper recycling. Studies have shown that most residents have good recycling intentions but need direction. Although there currently are many initiatives to educate residents, changing behavior takes time. The more times residents hear a consistent message, the more likely they are to change their behavior. Ohio EPA will use its communication channels to provide outreach for proper recycling.

Fiber - The fiber industry is experiencing a change in the composition of post-consumer fiber. Due to the move toward single-stream collection, the quantity of mixed paper coming out of processing plants has increased and the quantities of newspaper and high-grade paper have decreased. The mixed paper has less value than some of the segregated grands. Further, it is more difficult for processors to remove all commingled recyclables from recovered paper and produce bales of paper that meet manufacture's quality thresholds. The lower quality paper mix along with contamination have resulted in reduced fiber quality and value.

As was discussed in the Introduction in Chapter 1, a shift in the composition of residential trash and recyclables is occurring due to the upsurge in online shopping. The amount of cardboard in household waste continues to increase. While carboard also comprises a large percentage of residential recyclables, the portion of available cardboard that is recovered is low. One reason is that as consumers purchase more online and less at stores, cardboard that used to be recovered at retail outlets is now being disposed as trash. Ohio is home to several paper product manufacturers that currently source recovered paper from within Ohio. Some of those manufacturers have increased their demand for recovered fiber. Ohio's market will soon receive a major boost due to a cardboard manufacturer opening a new paper mill in the State's northwest region. That manufacturer will use 100 percent recycled feedstock, including mixed paper and cardboard, and is expected to eventually consume an estimated 165,00 tons of cardboard and 300,000 tons of mixed paper per year.

Barriers

Economic

Low value of fiber - At the time this state plan was prepared, the market value of fiber was at an all-time low. The cost of processing fiber increased at the same time the value of recovered paper has decreased. Several factors caused this low value. The overseas restrictions placed on imports of recovered material resulted in an over-supply of domestic paper in the United States. Also, as was mentioned above, paper collected through single-stream programs is more contaminated than paper collected separately. Combined, these two factors mean paper mills are paying less for recovered paper and can be more selective about their sources of feedstock.

Logistic

Contamination - Fiber collected through single-stream systems is often contaminated with other materials, such as plastics. For many pulpers, that contamination renders the paper unusable. It takes more sophisticated sorting equipment to separate fiber from other recyclables and improve the value of the fiber. The increase in online purchases has also resulted in residents putting more plastic packaging, such as polystyrene and film plastics, in recycling containers.

Convenience of recycling options - The less convenient a recycling service is the less residents are likely to use it. Areas served by drop-offs likely recover less material than areas served by curbside services. Residents that accumulate cardboard quickly may not be willing to make frequent trips to drop-offs. Further, unflattened boxes fill collection containers quickly and may inhibit collecting more material.

Inadequate recycling container capacity - Homeowners with curbside recycling service may have recycling containers with limited volume. Many communities still use 18-gallon totes to collect recyclables. It is difficult to put cardboard in those totes.

Continuous supply - Pulpers and converters need reliable, constant supplies of recovered fiber. That is hampered by the seasonality of paper generation and recovery. There are generally greater supplies of fiber during school terms and holidays and lower supplies during the summer.

Opportunities

Short-Term

Continue to support curbside recycling services - Ohio EPA will continue to use its community development and litter prevention grant to fund collection equipment and carts to start new or upgrade existing curbside recycling services.

Upgrade MRF equipment - There are several options for improving the capture rate and quality of paper from processing facilities. These options include more labor, slower processing speeds, and technology. Equipment arguably can make the biggest difference in producing the least contaminated fiber. Incorporating technology such as ballistic separators and optical scanners can improve the quantity and quality of fiber (and other materials such as plastics and glass). However, that technology is expensive. Public agencies and private companies both can request funding for equipment through Ohio EPA's grant programs. Ultimately, however, it may take funding from multiple stakeholders to make that equipment feasible for many MRFs.

Long-Term

Fiber-only collection program - Establishing a dedicated fiber-only collection program is an opportunity for state and local governments and private manufacturing and waste management companies to collaborate. Ohio EPA will gauge interest among private waste companies, solid waste management districts, and local governments for a fiber-only program. If enough interest exists, then Ohio EPA will facilitate a workgroup of stakeholders to provide a recommendation for a program.

Accompanying education and outreach opportunities

Update website - Ohio EPA will update its website to provide an expanded list of available financing opportunities for purchasing recycling carts. Ohio EPA will also work with communities interested in upgrading to cart-based collection programs identify available funding.

Collaboration with Amazon's Ohio distribution center - Ohio EPA will reach out to Amazon's Ohio distribution center to discuss possible options for collaborating on residential cardboard collection options and educating residents about recycling boxes. This could include educational material included with Amazon's

packaging, an electronic message sent to consumers after receiving their packages, and a verbal recycling reminder sent to those consumers who have an Alexa-enabled device.