

MATERIALS AND WASTE MANAGEMENT RESOURCE GUIDE

A PROJECT OF THE MATERIALS AND RECYCLING GROUP OF CHAMPIONS FOR SUSTAINABILITY,
A PROGRAM OF SUSTAINABLE PITTSBURGH



AUTHORED BY members of the Materials and Recycling Workgroup: Phyllis Barber, Highmark; Deborah DeLong, Chatham University; Benson Gabler, Pittsburgh Living Product Hub - International Living Future Institute (formerly with PNC Financial Services); Scott Golla (formerly with Westinghouse/US Steel/BNY Mellon and United States Steel); Kathy Hrabovksy, Allegheny County; Kimberly Olivito; Allison Robinson, UPMC; Valerie Skinner, MGM Resorts International (former UPMC intern)

THIS GUIDE IS BASED ON the unpublished manuscript, "Materials and Recycling Group (MARG): Preliminary Analysis of Waste Management Practices in the SWPA Business Sector" (Christen Dinger, Mollie Pollack, Sara Rubenstein & Suzanne Wasilko, 2015). The project was completed as a course requirement for BUS580 Sustainable Behavior Change, developed and instructed by Dr. Deborah DeLong, Associate Professor of Marketing, Chatham University.

© 2018 Sustainable Pittsburgh

Table of Contents

- Preface 5
- Introduction 6
- Waste Management Methods 8
- Upstream Waste Minimization: Purchasing Entities and Options 12
- Measurement and Reporting 16
- Waste Audits 18
 - Waste Audit Resources 26
- Employee Engagement in Sustainability 27
- Forming a Waste Hauler Contract 32
- Resources and Tools 35
 - Get to Know Pennsylvania Resources Council 36
 - Waste Service Providers in Southwestern Pennsylvania 37
 - Tool for Summarizing Waste-Diversion Options 49
 - Tool for Summarizing Applicable Regulations 53
 - Purchasing Decision Flowchart 57
 - Material Economy Continuum 60
 - Signage Examples 63
- Closing Comment 65
- Glossary of Terms 66
- About Sustainable Pittsburgh and Champions for Sustainability 68
 - Contributors 68
 - Special Thanks 68
- For More Information 69

Figures

Figure 1. Waste Management Hierarchy [9](#)

Figure 2. Purchasing Cooperative..... [13](#)

Figure 3. Group Purchasing Organization [14](#)

Figure 4. Supply Chain Management Division..... [15](#)

Figure 5. ENERGY STAR Portfolio Manager’s Waste & Materials Tracking Module..... [17](#)

Figures 6, 7a, 7b. Baseline Waste Audit – Average of Two Weeks Separated into Two Audit Days – Waste Sample . . . [23](#)

Figures 8, 9a, 9b. Three-Month Follow-Up Waste Audit – One-Day Waste Sample [24](#)

Figure 10, 11a, 11b. Six-Month Follow-Up Waste Audit [25](#)

Figure 12. Factors Required for Behavior Change to Occur: Capability, Motivation, and Opportunity [27](#)

Figure 13. Overcoming Barriers to a Satisfactory Waste-Hauler Contract [32](#)

Figure 14. Upstream Materials Handling – Purchasing [58](#)

Figure 15. Downstream Materials Handling – Packaging [59](#)

Figure 16. Material Economy Continuum..... [61](#)

Tables

Table 1. Tactics for Engaging Employees in Sustainability Behaviors. [28](#)

Table 2. Tool for Summarizing Diversion Options..... [51](#)

Table 3. Tool for Summarizing Application Regulations [55](#)

PREFACE

All too often we complacently accept that our waste simply goes “away,” with no concern for where “away” is or if there is somewhere more appropriate for our waste to go. The nonchalance of this approach is not only environmentally irresponsible, but it runs counter to the very basic principles of business.

Waste in any business needs to be considered an opportunity to improve efficiency. Whether the waste is a byproduct of a manufacturing process or is simply the remnants of administrative activities, it can be avoided, reused, or recycled. In cases where the waste cannot be practically recovered for an alternative use, we can rethink the process that generated the waste and replace it with a more sustainable material.

In every case, thoughtful, informed, and pragmatic waste management decisions can save money on purchased products, avoid costs of disposal, and generate revenue as a sold resource. This guide offers the insights that can help you make the most appropriate decision for your enterprise. This resource pulls together the collective experience of many successful experts who have demonstrated that waste is not inevitable.

Justin Stockdale

Co-Executive Director, Pennsylvania Resources Council

INTRODUCTION

Waste management is one of the most well-known connections to sustainability and our environment for all – residents of neighborhoods, employees of businesses, and students of schools and universities. Because of its widespread visibility in our communities and our workplaces, it is important for sustainability professionals to provide accurate information, direction, and transparency of waste management processes. Often the way we perceive an organization’s waste and recycling program shapes our perception of its commitment to sustainability initiatives.¹

Engaging citizens in waste and recycling initiatives at their homes and workplaces is crucial to getting buy-in, trust, and commitment to improving sustainability as a whole in our region. The topic of waste and recycling can be complex in Southwestern Pennsylvania, but it is an important challenge to overcome given its significance in engaging people in sustainable solutions and conservation of resources.

Formation of the Materials and Recycling Group

In 2015, sustainability professionals within the Champions for Sustainability network (C4S) of Sustainable Pittsburgh formed a workgroup, Materials and Recycling Group (MARG), in response to the desire to solve related challenges in the region. The workgroup is focused on understanding the region’s sourcing, handling, and end-of-life management of waste and recyclables.

MARG collaborated with graduate students from Chatham University to analyze and assess waste management best practices, program design, and implementation throughout Southwestern Pennsylvania. Specifically, the graduate students analyzed the variety of waste management needs within a sample of Pittsburgh-based companies and organizations, the availability of vendors and haulers for addressing these needs, key criteria used to compare and secure vendors and contract terms, ongoing issues with service gaps or inconsistencies, and employee engagement challenges at the companies. This research is provided in the unpublished manuscript, “Materials and Recycling Group (MARG): Preliminary Analysis of Waste Management Practices in the SWPA Business Sector.”² Its contents helped lay the groundwork for a comprehensive assessment of waste management conditions via online survey, “MARG Survey of Current SWPA Business Practices,” developed and fielded by Sustainable Pittsburgh in 2016 to reach sustainability professionals throughout the Pittsburgh region. Results from the online survey were compiled and reported with assistance from Chatham University (2016).

Members of MARG are sustainability professionals involved with the management or operations of facilities that are, primarily, of the office-use type in the areas of local government, banking, commercial real estate, healthcare, business, finance, law, and energy. Although the real estate portfolios of some members include hospitals, laboratories, universities, warehouses, shipping and logistics, and manufacturing, the resource guide is limited in scope to materials and related issues commonly found in an office setting.

¹ Dinger, C., Pollack, M., Rubenstein, S., & Wasilko, S. “Materials and Recycling Group (MARG): Preliminary Analysis of Waste Management Practices in the SWPA Business Sector.” Unpublished manuscript, Falk School of Sustainability, Chatham University, Pittsburgh, PA, 2015.

² Ibid.

Intent of Resource Guide

This resource guide aims to provide relevant information regarding waste management options and practices to ensure sustainability professionals and their internal business partners are able to select the best waste management systems for the needs of their operations. As previously stated, the guide is informed by the preliminary research in Dinger et al. (2015), the online survey developed by Sustainable Pittsburgh (2016), and subsequent analysis and report of survey results provided by Chatham University (2016).

Specific themes identified in the MARG survey are addressed in the guide. These topics include guidance for recognizing waste management needs, finding suitable vendors for contract services, choosing one or more vendors based on relevant and essential criteria, structuring contracts to ensure the standard of service meets our organization's expectations, and engaging communities and employees in waste and recycling initiatives. This guide also includes tools and resources to assist in the areas of diversion of residual waste, regulated waste, and the material economy continuum.

WASTE MANAGEMENT METHODS

Although the terms are sometimes used interchangeably, it's worth noting a distinction between **disposal** and **disposition** of materials and waste. Especially with regard to IT and other physical assets, disposition is the strategic process of finding the most cost-effective, sustainable means of managing materials and assets at the end of life. Disposition might entail refurbishing and reselling assets, including scrubbing data hard drives, if necessary. Disposal refers more broadly to the process of getting rid of or sending items "away," as mentioned in the Preface.

Disposed waste, otherwise known as trash, ultimately goes to one of a few main destinations: landfill, incineration (also called waste-to-energy treatment), or other/unknown (when you're unsure of where your trash goes after it's picked up). Other waste-to-energy treatments include the capture and treatment of landfill gas released through decomposition at the landfill in order to produce electricity, heat, and/or fuels; and anaerobic digestion of organic waste, to produce biogas.

Unfortunately, Pennsylvania is one of the country's largest importers of trash, and received more than 7 million tons of out-of-state garbage from 23 states in 2014 — on par with the 8.5 million tons Pennsylvanians generated in 2013.³

Waste in landfills emits hazardous greenhouse gases like methane, hydrogen sulfide, and ammonia. In addition, landfill waste can leach dangerous chemicals into groundwater.⁴ Pennsylvania has 45 permitted municipal waste landfills, including three landfills in Allegheny County and 20 in Western Pennsylvania.⁵

Waste incineration takes up less space, but has substantial negative health and environmental effects. Incinerators produce a significant amount of air pollution in the form of greenhouse gasses and other toxins, like dioxins, which are known human carcinogens. Additionally, the pollution increases the risk of respiratory illness among residents.⁶ Pennsylvania has six permitted incineration/waste-to-energy facilities, all located in Eastern Pennsylvania, that manage over 20 million tons per year of municipal waste.⁷

In some cases, you may not be certain where your trash is going because of a lack of reporting information from the waste hauler or undocumented chain-of-custody details.

3 Casey Introduces Legislation to Restrict Flow of Trash into PA from Other States. Office of U.S. Sen. Bob Casey. 5 Aug. 2015. Web. Accessed 5 March 2018.

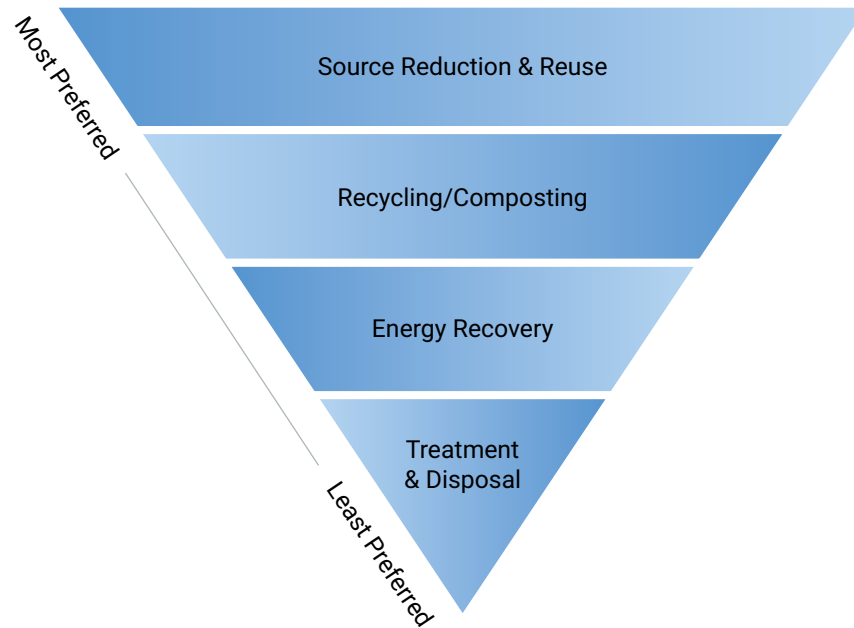
4 Masoner, Jason R., et al. "Landfill Leachate Released to Wastewater Treatment Plants and Other Environmental Pathways Contains a Mixture of Contaminants Including Pharmaceuticals." *Environmental Health - Toxic Substances Hydrology Program*, U.S. Department of the Interior U.S. Geological Survey, 13 Nov. 2015. Web. Accessed 5 March 2018.

5 Pennsylvania Department of Environmental Protection. "Municipal Waste Landfills and Resource Recovery Facilities," N.d. Web. Accessed 5 March 2018.

6 Dinger et al., 2015.

7 Pennsylvania Department of Environmental Protection. "Municipal Waste Landfills and Resource Recovery Facilities," N.d. Web. Accessed 5 March 2018.

Figure 1. Waste Management Hierarchy



Source: U.S. Environmental Protection Agency.⁸

Three other waste management methods are alternatives to disposal:

- Donation or reuse – materials sold or given to someone who can still use them.
- Recycling – materials (most commonly paper, glass, plastic and aluminum) collected and manufactured into new products.
- Composting – organic waste materials (most commonly food scraps and yard debris) that are decomposed and, ultimately, transformed into soil-like fertilizer.

The National Recycling Coalition defines recycling as the series of activities by which discarded materials are collected, sorted, processed, and converted into raw materials and used in the production of new products. It excludes the use of these materials as a fuel substitute or for energy production.⁹ Recycling reduces the amount of waste materials sent to landfills and incinerators. Recycling works to reduce energy use, air pollution, greenhouse gas emissions, water pollution, and the consumption of fresh raw materials by decreasing the need for conventional waste disposal as defined above.¹⁰ For instance, it only takes six weeks for an aluminum can

⁸ U.S. Environmental Protection Agency, "Sustainable Materials Management: Non-Hazardous Materials and Waste Management Hierarchy." 10 August 2017. Web. Accessed 5 March 2018.

⁹ U.S. Environmental Protection Agency. "Measuring Recycling Guidance Glossary," 14 Feb. 2018. Web. Accessed 5 March 2018.

¹⁰ Banerjee, Reshmi. "Importance of Recycling." *International Journal of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering*, Vol. 3, No. 6, June 2015, pp. 53–55. Web. Accessed 5 March 2018.

to go from the recycle bin to a new can – and recycling 1 ton of aluminum cans saves the energy equivalent of 1,234 gallons of gasoline.¹¹

The two other most common alternatives to conventional disposal, donation or reuse and composting, will be addressed in a future edition of the Materials and Waste Management Resource Guide.

Reduce, Reuse, Recycle

“The most effective way to reduce waste is to not create it in the first place. Making a new product requires a lot of materials and energy – raw materials must be extracted from the earth, and the product must be fabricated then transported to wherever it will be sold. As a result, reduction and reuse are the most effective ways you can save natural resources, protect the environment and save money.”¹²

REDUCE: The best way to manage waste is to not produce it in the first place – thereby not requiring resources like energy and water to recycle or trash it. By reducing waste at the source, we reduce environmental impact and waste management costs. To learn more about ways to reduce your organization’s use of materials at the source, please view the [Upstream Waste Minimization: Purchasing Entities and Options](#) section of this Resource Guide.

REUSE: Once a product has entered the market, it’s important for organizations to reuse the product as much as possible before replacing it. There are organizations that can assist with this for material reuse. The [Resources and Tools](#) section of this guide outlines many organizations and groups to partner with for reuse options.

RECYCLE: If you are unable to eliminate a product from your operations, and there are no viable reuse options, the third option is to recycle the product. This means ensuring that the product or the product’s materials and components are “recycled” to be used again for the same or a new purpose.

Barriers to Recycling

Despite the ubiquity of recycling initiatives, it’s important to note a number of issues inherent to the recycling model used within the United States. The recycling system, as we know it, uses an entirely market-based model. Items brought to recycling centers are sold within the commodities market after being sorted, meaning that if the market for a given recyclable dries up, the product may end up going to a landfill. Other items, like drywall, technically are recyclable, but because no one in the region consumes them, they are unrecyclable in western Pennsylvania.¹³

When the market for a recycled commodity weakens, becoming less profitable for recycling centers and municipalities,¹⁴ businesses will find it more difficult to find haulers to divert their various waste streams. In China, where nearly half of all U.S. recycling goes, a ban on the import of 24 types of solid wastes went into effect in January 2018. Recycling companies have scrambled for alternatives since China announced the ban in summer 2017.¹⁵

11 Ecoparts.com. “How Does Recycling Reduce Waste?” 30 March 2017. Web. Accessed 24 Aug. 2018.

12 U.S. Environmental Protection Agency, “Reducing and Reusing Basics.” 23 April 2017. Web. Accessed 5 March 2018.

13 Dinger et al., 2015.

14 Davis, Aaron C. “American Recycling Is Stalling, and the Big Blue Bin Is One Reason Why.” The Washington Post, WP Company, 20 June 2015, Web. Accessed 5 March 2018.

15 Profita, Cassandra, and Jes Burns. “Recycling Chaos in U.S. As China Bans ‘Foreign Waste.’” NPR, NPR, 9 Dec. 2017, Web. Accessed 5 March 2018.

Additionally, single-stream recycling generally requires sorting to be done mechanically. However, non-recyclable or non-preferred items may get mixed in with the single-stream input, resulting in contaminated output that is less attractive to buyers on the secondary market. Contamination can also cause entire batches of recyclables to be sent to the landfill.¹⁶ While consumer convenience has led single-stream recycling to be adopted almost universally, these issues threaten the continued effectiveness of recycling at an industry level.¹⁷

Champions for Sustainability surveyed its members about their organizations' waste disposal and diversion practices. Although the survey was completed by a small population, the results are notable for two questions addressing barriers to recycling.

The survey asked members about level of satisfaction with their hauler. Feedback included –

- **Communications:** Could be improved. Hauler is slow to respond to issues. Hauler does not always notify clients of changes to policy and materials collected.
- **Reporting:** Difficult to receive data from some haulers. Not satisfied with the level of reporting or lack thereof.
- **Choice:** Use many haulers. Would like to find hauler that handles all waste materials and recycling. Need better options for hard-to-recycle items like polystyrene (aka Styrofoam), pallets, and others.

The majority of respondents noted these as barriers to proper recycling and waste management in their organizations:

- Inconsistent recycling instructions from vendors;
- Lack of choices when selecting haulers and vendors;
- Inconsistency between facilities;
- Food waste contamination;
- Employees who try to recycle items that are not recyclable;
- Employees who do not believe the recycling program is effective; and
- Cost-prohibitive composting options.

Almost half of respondents also cited the following barriers:

- Employees are confused about how to comply;
- Janitorial staff do not comply;
- Haulers and vendors do not comply with contract terms; and
- Some materials do not fit into any specific category.

These issues by no means are meant to discourage recycling efforts; rather, recycling should be recognized as a small piece of the larger sustainability strategy that might include efforts like composting and zero-waste strategies. Instead of viewing recycling as the “magic bullet” to sustainable waste management, it is important to understand it within the larger context of an integrated system of strategies. We discuss one of these strategies, upstream waste minimization, next.

¹⁶ Davis, 2015.

¹⁷ Dinger et al., 2015.

UPSTREAM WASTE MINIMIZATION: PURCHASING ENTITIES AND OPTIONS

To effectively manage materials in their organizations, sustainability professionals need to understand where the materials come from and where they ultimately end up. Knowing how materials flow provides insight as to **where to find materials** within the organization, how **products were made and transported** to the organization, how to **establish a materials usage baseline**, and how to **measure progress** against that baseline.

If sustainability officers want to **influence upstream purchasing habits to minimize downstream burden**, they need to get to know the supply chain category managers who purchase the products and services used at the organization. Supply chain managers vet vendors and develop contracts, making them the gatekeepers of the materials in the organization. As such, they are an invaluable resource for promoting sustainable purchasing.

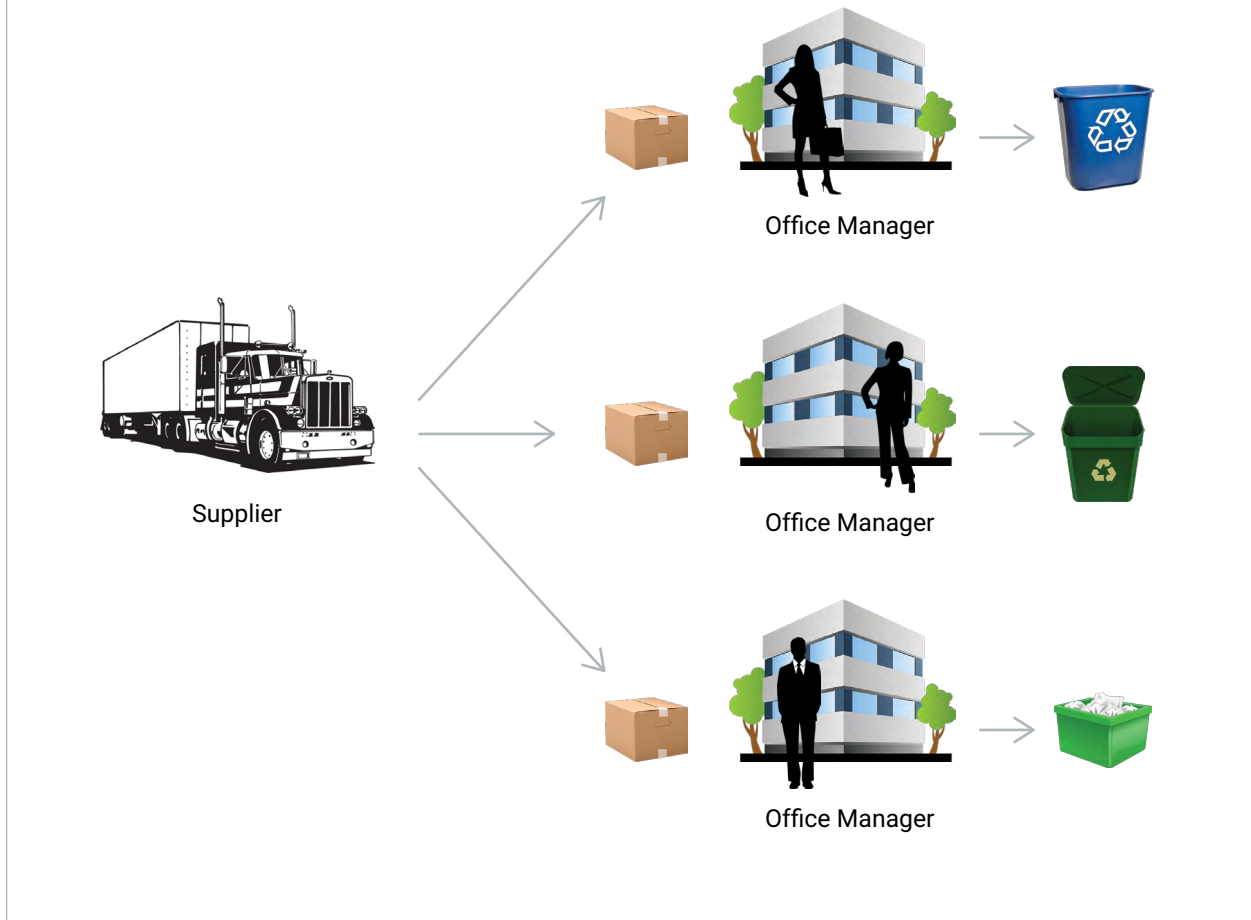
This section outlines the ways in which purchasing entities might be structured in small, medium, and large organizations (with size defined by [designations outlined](#) in the Sustainable Pittsburgh Challenge).

Small-Business Purchasing Options (<=75 employees)

- Material used in small volumes ordered as needed, per month, or more frequently.
- Office manager places order from designated suppliers, especially ones that cater to small businesses.
- Office manager may optimize purchasing by participating in a **purchasing cooperative** of small businesses.
 - A **purchasing cooperative** is an entity external to the organization that facilitates buying and distributing bulk purchases across multiple organizations for optimized pricing.
 - › Diversion of materials (reuse, recycle, resell) is not handled through cooperatives; individual organizations must address this on their own.
 - › Often limited to acquisition of products and services only.
 - › Often consist of associated governments, school districts, and small businesses of similar industries or similar locations.

Figure 2. Purchasing Cooperative

Small businesses can form a purchasing cooperative that allows them to buy goods in bulk to get a better price. Each business is responsible for the diversion or disposal of its own products.



Medium-Business Purchasing Options (76–500 employees)

- Rate of materials usage is generally consistent, with moderate to high-volume usage per week or month.
- May have an internal purchasing department called purchasing or **materials management, procurement, or supply chain management**.
- A purchasing or **materials management department** is like an internal purchasing cooperative among departments within an organization.
 - Has the same goal of optimized pricing for volume demand.
 - May include acquisition of products and services.
 - May also address material disposition:
 - › Asset disposition (donating or selling of durable assets for reuse).
 - › Material diversion.
 - › May participate in an industry-based **group purchasing organization**, or GPO (a larger, enhanced

version of a purchasing cooperative).

- » A GPO is external to a participating organization.
 - » Again, most GPOs do not address material disposition, which is dependent on the organization usage rate and value of materials.
- Establishes terms and conditions with the suppliers



Large-Business Purchasing Options (>=500 employees)

- Uses materials at a very high volume per day or per week.
- Will have an internal division called **supply chain management** dedicated to handling vendor relations, purchases, and dispositions.
 - Often **supply chain management** includes materials management as a department within the division.
 - › Addresses planning, management of material:¹⁸
 - » **Sourcing** (does material/service exist, where can it be found)
 - Vendor vetting for green products.
 - » **Procurement** (acquisition of products/services)
 - Includes EP (environmentally preferable) products.
 - » **Contractual agreements** for product liability, external maintenance, and operations support services.
 - Broker environmentally preferable purchasing (EPP) – i.e., for goods and services that cause less harm to humans and the environment than competing goods and services.
 - Solicit commitment to Extended Producer Responsibility (EPR), whereby manufacturers are

¹⁸ Note that in sustainable operations, “purchasing” describes a price-based buying process vs. strategic sourcing through a supply chain focused on creating value. Supply chain procurement incorporates strategic sourcing to define what is being purchased and why.

held responsible for the costs of managing their products at the end of life as a means of encouraging them to design environmentally friendly products and packaging.

- » **Warehouse management** for storage and internal distribution.
 - First instance, in the supply chain where diversion may occur.
 - » **Inter-facility logistics** (transportation of material to multiple facilities).
 - » Asset **maintenance** (product maintenance).
 - » Asset **disposition** (resell, donate, reverse logistics to original equipment manufacturer, or OEM).
 - » Material **diversion** (at site of product usage as part of operations).
 - » **Value analysis teams** (users of materials and services).
- › Often are closely associated with the finance/accounting division.
- › May also participate in an industry-based **GPO** to optimize cost for industry-based high-demand products and external quality control of material cost management.

Figure 4. Supply Chain Management Division

A supply chain management division is responsible for ensuring a reliable stream of goods and services to the business. Supply chain management divisions also negotiate vendor contracts and may participate in industry GPOs.



Summary of Types of Purchasing Entities

Internal to organization:

- Office manager (small)
- Materials management/ purchasing department (medium)
- Supply chain management division (large)

External to organization:

- Purchasing cooperative (small)
- Group purchasing

MEASUREMENT AND REPORTING

Measurement and reporting of waste, recycling, and other diversion streams is important in establishing diversion goals, reporting against those goals, and engaging employees in waste management initiatives. Obtaining consistent and timely collection data from waste haulers is critical. See [Forming a Waste Hauler Contract](#) for guidance on obtaining data from haulers.

Tracking this data can be done in a basic Excel spreadsheet that details by facility each major waste stream and uses consistent units of measure. Additionally, two free online tools are available from the Environmental Protection Agency: ENERGY STAR Portfolio Manager and the WARM model.

ENERGY STAR Portfolio Manager

ENERGY STAR Portfolio Manager has added a Waste & Materials tracking module that complements the Energy and Water usage modules you may already be using for any facility you track in Portfolio Manager.

The module asks 1) “What waste/material are you tracking? Trash, Mixed Recyclables, Composting – Mixed/Other,” and 2) “What are you doing with it? Disposing It, Composting It, Recycling It, Donating/Reusing It.”

Waste meter types can be added based upon the composition of your waste stream. The waste meter type is a combination of one of Portfolio Manager’s four waste management methods (Disposed, Recycled, Composted, Donated/Reused) and one of the 29 waste material types that can be tracked individually – for example, “Disposed – Trash” or “Donated – Furniture.” The total number of waste meter types is not $4 * 29$ because some of the waste material types cannot be composted (e.g., batteries), recycled (e.g., food scraps), or donated (e.g., mixed paper). All [29 waste material types](#) can be disposed.¹⁹

In Portfolio Manager Reporting, there are metrics for each subtotal and a total across all four methods [“Total Waste (Disposed and Diverted)”].

¹⁹ “What Types of Waste and Materials Are Tracked in Portfolio Manager?” *ENERGY STAR Buildings FAQs*, Web. Accessed 9 March 2018.

Figure 5. ENERGY STAR Portfolio Manager's Waste & Materials Tracking Module

The module tracks diversion efforts across four waste management methods (Disposed, Recycled, Composted, Donated/Reused) and 29 waste material types.



U.S. Environmental Protection Agency's Waste Reduction Model

The EPA Waste Reduction Model (WARM) helps solid-waste planners and organizations track and voluntarily report greenhouse gas (GHG) emissions reductions from several different waste management practices. WARM calculates and totals GHG emissions of baseline and alternative waste management practices: source reduction, recycling, anaerobic digestion, combustion, composting, and landfilling.

WARM includes data on the amount of waste handled by material type (e.g., aluminum cans, corrugated containers), the associated waste management practice used (recycling, composting, combustion, anaerobic digestion, or landfilling) and the alternative practice (which could include source reduction).

Additional user inputs include the following:

- Landfill characteristics (e.g., presence of landfill gas collection system),
- Anaerobic digestion characteristics (e.g., wet or dry digester),
- Material characteristics (e.g., produced from virgin materials or with recycled inputs),
- Location for regional electricity grid, and
- Waste transport distances.

For more information, access WARM Model: www.epa.gov/warm.

Context/Scope

As stated in the introduction, this guide is intended to focus on office-use type facilities. As organizations work to move their operations away from a linear material economy, through a net-zero waste economy, to a circular material economy (see [Material Economy Continuum](#) section), they will be required to consider various methods of diverting waste from landfill such as recycling, composting, donation, or revision of purchasing and delivery practices to include more efficient upstream and downstream processes. In order to determine the most effective diversion method for a particular facility, facility managers and operators should first consider performing a comprehensive waste audit to determine the waste stream composition at the facility.

A comprehensive waste audit includes an initial waste audit and follow-up audits to track progress over time. These audits can be performed in-house or by a consulting waste expert. In either case, a comprehensive waste audit will require “diving” into the current landfill, recycling, or composting dumpsters, separating the waste into various types, weighing the various waste types, and recording this data for the various types in a spreadsheet or other tracking system.

NOTE OF CAUTION: When performing waste audits, audits should be impartial when possible. Though the hauling company may offer a waste audit, it may involve conflicts of interest if expectations are confined to the services offered by that specific hauler. See the [Get to Know Pennsylvania Resources Council](#) section for information about the PRC, which performs independent audits. Care should be taken with waste audits, as hazardous waste may be included. Protective clothing is recommended.

Waste Audit Overview

By converting the exact weights to percentages of the entire waste stream, facility managers can quickly determine the facility diversion potential and set diversion goals. By converting the exact weights to percentages in individual streams, facility managers can quickly determine the success of any existing recycling, composting, or other programs and consider revisions as required. By studying all types of waste generated, facility managers can determine where the waste is coming from, how the waste might be diverted and how purchasing decisions might influence waste diversion, and work to create programs that will help to meet diversion goals. By recording the weights and percentages in a tracking system, facility managers can track progress as they implement waste diversion programs.

The initial waste audit should be performed over a five- or seven-day period, at least, depending upon the facility use and operation. The waste stream composition for these days can then be averaged to provide an accurate representation over the typical operating period. If seasonal influences are a concern, additional initial waste audits can be performed, as required, to create a comprehensive analysis of the facility over a longer period.

Once the initial waste audit is analyzed, diversion goals are set, existing programs are revised as required, and new programs are implemented, the audit team can perform follow-up waste audits as required. Follow-up waste audits might be performed as individual changes are implemented to track the effect of any one

variable. In situations where new, overall programs are implemented at one time, follow-up waste audits might be performed at the three-month, six-month, and one-year intervals to track progress toward diversion goals. Information from the follow-up waste audits can be included in occupant/employee engagement programs to inform building users on progress, encourage program compliance, and congratulate all involved when goals are achieved (see [Signage Examples](#)). After goals are achieved, facility managers and operators should consider annual follow-up waste audits to ensure the facility continues to meet diversion goals and/or to identify and communicate changes that may be required.

Please explore the [Practical Application](#) and [Comprehensive Waste Audit Result Sample](#) sections, which follow. The Practical Application section provides sample language for use in an RFP for waste audit services. The Comprehensive Waste Audit Result Sample illustrates a successful comprehensive waste audit and two successful follow-up audits, which aided in program design and implementation of an upgraded recycling program in a local office facility.

Practical Application

The following Scope of Work statement provides language that may be adapted as appropriate when defining the requirements of a comprehensive waste audit comprising an initial waste audit and follow-up waste audit(s).

Note that this sample template is specific to a particular organization’s needs. Details of the Scope of Work – how many people should be involved in the audit, how many cubic yards of each type of waste should be collected, frequency of follow-up waste audits, and so on – will vary based on the facility size and resources.

The bottom line is that an organization needs to understand what it is throwing away to most effectively implement diversion programming. In cases where the organization lacks funding/resources for waste audits, it should conduct routine visual inspections of the waste stream to monitor for diversion opportunities and failures.

Scope of Work Template

INITIAL WASTE AUDIT

- This service shall be performed initially and at each one-year mark after recycling program implementation for the duration of the contract, as required. The service shall be scheduled in cooperation with all offices and managers involved in the process.
- This service shall include an initial “walk-thru” of the facility with a facility representative to observe the existing landfill disposal, recycling, composting, and other waste management systems. Results of the “walk-thru” shall be communicated to the facility representative present for the “walk-thru” verbally at the time of the “walk-thru” and shall be included in a final report.

- The waste audit conducted after the initial “walk-thru” shall be conducted on at least two separate days over two consecutive weeks and shall include a representative sample of waste collected from each day of a weekly operating period.
- The service shall be performed using at least three persons from the contractor’s staff.
(Note: number of staff will be based on the size of facility being audited.)
- The contractor shall provide and require its employees to wear badges and clothing identifying them as the contractor’s employees.
- The contractor will provide and require its employees to wear protective personal equipment such as, but not limited to, pants and shirts that protect the arms and legs, close-toed shoes, gloves, and eye protection.
- The contractor shall be required to provide:
 - Copies of driver’s licenses and vehicle identification for the organization’s employees and vehicles present on site.
 - Labeled sorting bins or barrels.
 - Bags for future recycling or landfill disposal.
 - Scales for weighing the materials.
 - Any equipment required to determine the volume of materials.
 - Tables and chairs required to facilitate sorting and weighing.
 - Tarpaulins required to protect the sorting area.
 - Cleaning materials required to return the sorting area to the state existing before sorting.
- The contractor’s employees will be required to transport all equipment to and from the assessment site.
- This service shall include:
 - Observation of existing landfill disposal, recycling, composting, and other waste-reduction management systems via an initial “walk-thru” of the site or facility.
 - Assessment and analysis of 3 cubic yards of each type of waste collected over a 24-hour period from the work stations, kitchens/kitchenettes, lobbies, restrooms, bathrooms, meeting rooms, conference rooms, etc., as required by the specific building use. *(Note: collection size will depend on the facility size of the facility and should be large enough to defensibly represent waste generation at the facility.)*
 - Determination of the types, weight of, and estimated volume of recyclable, compostable, non-recyclable materials to create a baseline and track the source of the waste including at least the following:
 - › Source of the Waste
 - › Total Material Solid Waste Generated
 - › Total Material Solid Waste Recycled

- › Total Material Solid Waste Composted
- › Diversion Rate
- › Composition of Waste by Type – Materials to be Sorted Shall Include:
 - › White ledger paper
 - › Mixed paper, newspapers, magazines
 - › Plastics 1-5 & 7 and containers
 - › Cardboard
 - › Metal cans
 - › Glass bottles and jars
 - › Dairy and juice containers
 - › Other Aseptic containers
 - › Toner cartridges
 - › Food scraps
 - › Reusable items (clothing, books, pens, etc.)
 - › Paper towels
 - › Disposable service-ware (foam cups, coffee cups, coffee cup lids, etc.)
 - › Plastic grocery bags
 - › K-cups
 - › Other categories may be suggested at the site
- Provision of spreadsheets, in digital form, showing baseline data, illustrating the measures described above, that will create a baseline and will be used for tracking performance over the following year.
- Provision of a written final report, in digital form, describing all findings and recommendations, and discussing the baseline data through charts, graphs, and text.
- Spreadsheets and report shall meet the requirements of Sustainable Pittsburgh’s Sustainable Pittsburgh Challenge Action Reporting System (www.spchallenge.org).
- Analysis of the building waste removal, recycling, signage, and education programs including a discussion of the existing and recommendations for improvement in:
 - › Overall waste management system.
 - › Separation and/or collection methods for the materials, including organic materials and polystyrene.
 - › Opportunities for income from the sale of materials.
 - › Signage, communication, and education of building occupants.
- A follow-up meeting where the spreadsheets and written report will be presented and at which the recommendations will be discussed.
- Recommendations shall include options that will aid the facility managers in further diversion of waste from landfill by reducing food waste and/or increasing recycling, composting, donation, or other methods.
- Follow-up support which will address implementation of recommendations.
- The facility managers shall provide:

- › An appropriately sized indoor space for the assessment.
- › 3 cubic yards of bagged landfill waste labeled with the building name and collection day.
- › 3 cubic yards of bagged recyclable waste labeled with the building name and collection day.

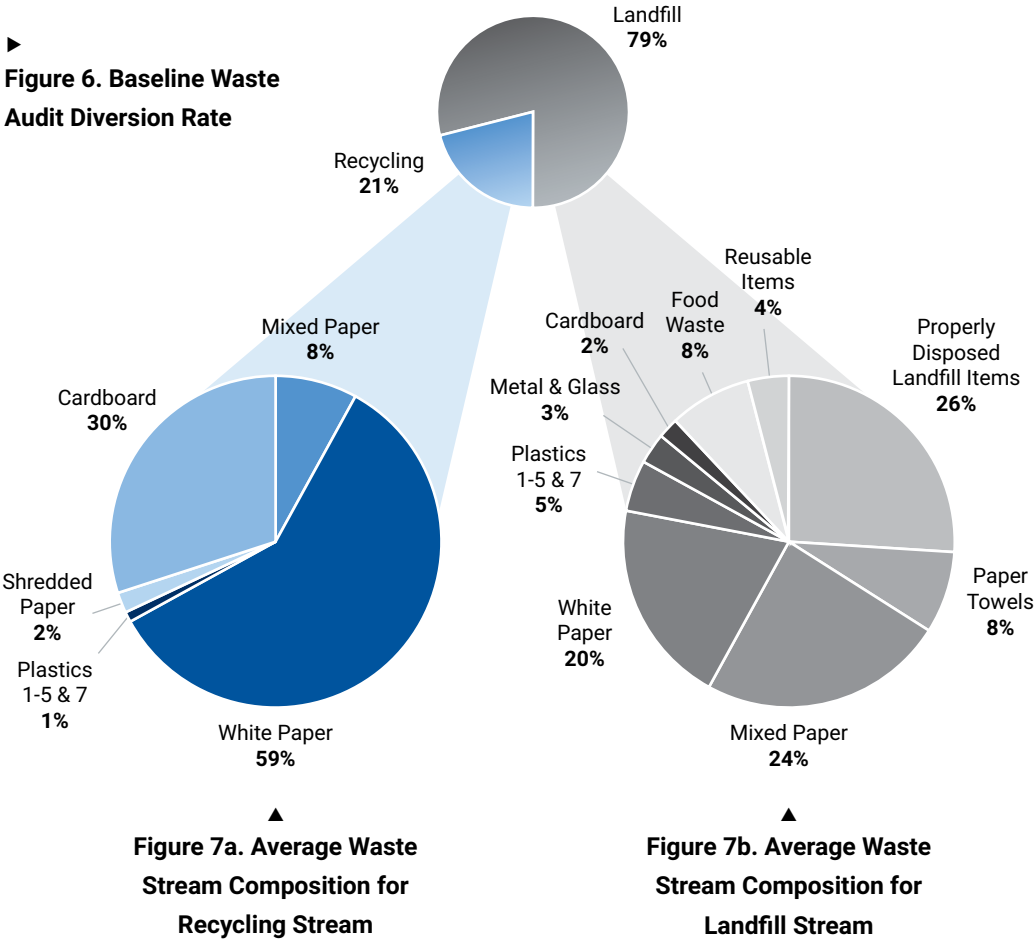
FOLLOW UP WASTE AUDIT – Same as Initial Waste Audit; provided at the three-month and six-month intervals occurring after the Initial Waste Audit, except for the following:

- This service shall be conducted on one day.
- The service shall be performed using at least two persons from the contractor's staff. (*Note: number of staff will be based on size of the facility being audited.*)
- This service shall include:
 - Assessment and analysis of 1 cubic yard of each type of waste collected over a 24-hour period from the work stations, kitchens/kitchenettes, lobbies, restrooms, bathrooms, meeting rooms, conference rooms, etc., as required by the specific building use.
 - Provision of a short (approximately three-page) written report, in digital form, describing all findings and recommendations, and discussing the baseline data through charts, graphs, and text.
 - The facility managers shall provide:
 - › An appropriately sized indoor space for the assessment.
 - › 1 cubic yard of bagged landfill waste labeled with the building name and collection day.
 - › 1 cubic yard of bagged recyclable waste labeled with the building name and collection day.

Comprehensive Waste Audit Result Sample

The following charts illustrate baseline and follow-up results for a waste audit of a typical office campus.

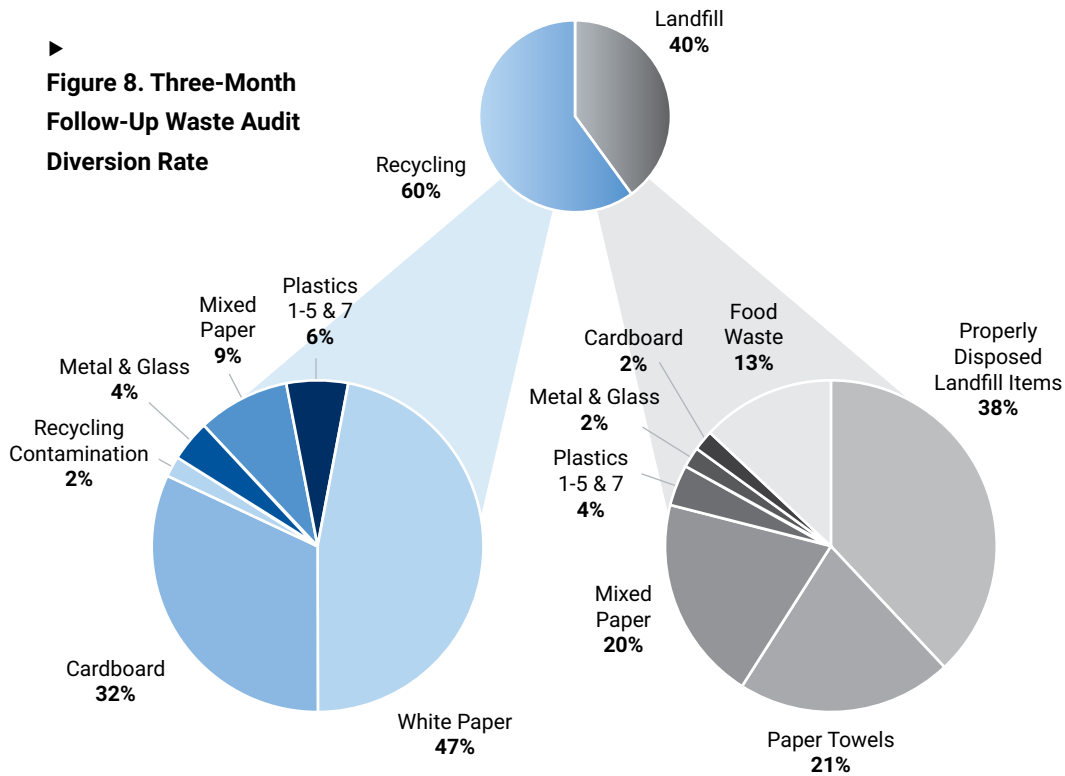
*Baseline Waste Audit – Average of Two Weeks Separated into Two Audit Dates – Waste Sample
(Pittsburgh Office Building, Approx. 350 Occupants)*



As indicated by the pie chart above (7b), this office facility had great potential to increase paper recycling, both mixed and white paper, but very little potential for increased recycling of metals, glass, and plastics, and very little potential for composting even when including paper towels. Based on this data, the facility managers set an ambitious goal of increasing recycling by 40%. Due to the amount of white paper and mixed paper available, the 40% goal seemed achievable. This baseline data was used in developing an upgraded recycling program in the facility.

Three-Month Follow-Up Waste Audit – One-Day Waste Sample
(Pittsburgh Office Building, Approx. 350 Occupants)

► **Figure 8. Three-Month Follow-Up Waste Audit Diversion Rate**

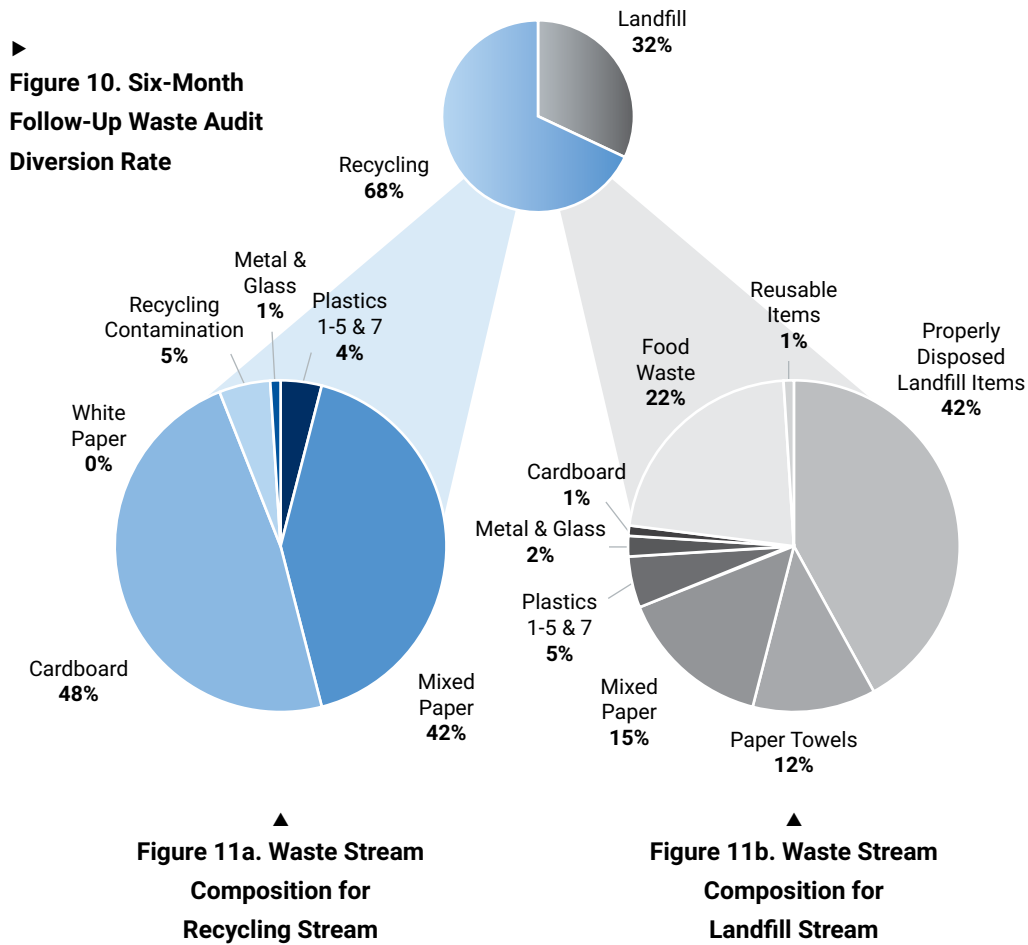


▲ **Figure 9a. Waste Stream Composition for Recycling Stream**

▲ **Figure 9b. Waste Stream Composition for Landfill Stream**

Due to an aggressive stakeholder education campaign, appropriate signage, issue of an anonymous survey, slight program revision to meet stakeholder needs, and discussion of the benefits of the upgraded recycling program on human health, this facility achieved positive results relatively quickly. At the end of three months, the facility increased the diversion rate from 21% to 60%, an increase of 185%.

Six-Month Follow-Up Waste Audit (One-Year Follow-Up Yielded Similar Results)
 (Pittsburgh Office Building, Approx. 350 Occupants)



Due to continued stakeholder outreach, at the end of six months, the facility reached a 68% diversion rate. Having diverted a great deal of material via the local single-stream recycling program, the facility managers are continuing education in order to capture the recycling that remains in the landfill waste stream. They are exploring additional options such as donating surplus materials and equipment (see [Local Organizations Accepting Donated Items and Materials](#)), and the use of upstream and downstream recycling organizations or businesses, such as [TerraCycle](#), to divert hard-to-recycle items from landfill. A one-year follow-up waste audit yielded similar results. The facility managers are planning to perform follow-up waste audits on an annual basis to ensure that the program continues to be successful.

Waste Audit Resources

Find additional resources in the [Resources and Tools](#) section of this Guide.

- Pennsylvania Resources Council: prc.org
- Pennsylvania Resources Council – Audits & Analysis: prc.org/programs/zwpa/audits-analysis
- U.S. Environmental Protection Agency (EPA) Reduce/Reuse/Recycle: www.epa.gov/recycle
- EPA Waste Reduction Model – WARM: www.epa.gov/warm
- EPA Sustainable Management of Food: www.epa.gov/sustainable-management-food
- EPA WasteWise: www.epa.gov/smm/wastewise
- Pennsylvania Department of Environmental Protection – Recycling Program Development and Implementation Grants: www.dep.pa.gov/Business/Land/Waste/Recycling/Municipal-Resources/FinancialAssistance/Pages/Recycling-Program-Development-and-Implementation-Grants.aspx

EMPLOYEE ENGAGEMENT IN SUSTAINABILITY

Figure 12. Factors Required for Behavior Change to Occur: Capability, Motivation, and Opportunity



However well-designed an organization’s waste management program might be, successful implementation depends upon employees who are willing and able to act. Therein lies the challenge, since unlike the promise of *Field of Dreams* – “if you build it, they will come” – employee engagement in sustainability often requires carefully crafted internal marketing strategies and tactics to make the vision a reality. Employees across all levels of the organization require a basic level of understanding, interest, incentive, and infrastructure to clarify how and why each individual should commit to improving the company’s sustainability performance. There are many approaches for increasing the visibility and perceived importance of sustainability efforts within the work setting. However, three factors must be present before actual behavior change will occur:²⁰

- **Capability:** the employees must know how to be sustainable in the workplace.
- **Motivation:** the employees must want to be sustainable in the workplace.
- **Opportunity:** the conditions must allow the employee to be sustainable in the workplace.

These three components of employee engagement work together to facilitate sustainability-related employee knowledge, intentions, and behaviors. A deficit in any of these areas will disrupt the process. For example, a well-intentioned employee who does not understand how to sort their waste materials into the appropriate bins won’t accomplish this task successfully (low capability). A knowledgeable employee with coworkers or a supervisor who discourages sustainable behavior in words or actions will suppress the employee’s commitment (low motivation). A work setting with a shortage of recycling bins or a poorly managed program creates motivational barriers (low opportunity). Fortunately, many approaches exist for targeting one or more of these components of employee engagement, helping to ensure the success of a company’s waste management goals and overall sustainability mission. The following table provides an overview of several tactics found to be effective.

²⁰ Source: Stephan, Patterson & Kelly (2013, p. 18) and Stephan, U., Patterson, M. & Kelly, C. (2013). “Business-Driven Social Change: A Systematic Review of the Evidence.” *Network for Business Sustainability*, Ivey Business School, Western University, 20 Feb. 2013. Retrieved 9 March 2018 from nbs.net/knowledge.

Table 1. Tactics for Engaging Employees in Sustainability Behaviors

Boosting Capability	Boosting Motivation	Boosting Opportunity
Formal Training & Orientations	Sr. Management Support	Visible Containers
Events & Activities	Supervisor Support	Policies & Programs
Newsletters & Articles	Coworker Support	Job Descriptions
Communications & Signage	Sustainability Department	Industry Conditions
Green Team Support	Reporting Metrics	Facilities/Retrofitting
Feedback Loops	Competitions	External Partnerships
Sustainability at Home	Individual Values	Strategic Alignment

Boosting Capability: Knowledge, Ability, Confidence

- **Formal Training & Orientations:** Employees can be formally educated on the opportunities to be sustainable at work. Specifically, new employee orientations can set the tone from the first day regarding company policies and processes that all employees are expected to follow in order to reduce waste.
- **Events & Activities:** Special programs offered on a regular basis can expose employees to a variety of topics related to sustainability in order to enhance understanding and familiarity. Sessions can provide information and calls to action for general topics (e.g., biodiversity, climate change) or topics of particular relevance in their industry (e.g., water quality or air quality in a manufacturing sector).
- **Newsletters & Articles:** Short pieces on sustainability-related topics can be shared via internal communications platforms, ideally those that employees are likely to open voluntarily on a regular basis (e.g., intranet sites, companywide emails). Articles can be solicited from different departments and from credible sources to convey the significance of sustainability across functional areas and at all levels of the company.
- **Communications & Signage:** Ongoing communication is important to reinforce knowledge of specific steps to take when attempting to participate in a sustainable practice such as recycling, composting, reducing paper waste, or other protocol. More effective signage has white space, simplified language, illustrations of waste materials and associated instructions, tangible examples of measures (e.g., in football fields rather than meters or yards), and positive appeals for action rather than fearful or coercive wording. See [Signage Examples](#) in the Resources and Tools section.
- **Green Team Support:** Peer-to-peer education can be provided by designating certain employees as Green Ambassadors or Green Team members who help inform newer or less knowledgeable employees of how to improve their sustainability performance. This informal training can be more effective than formal training since it can include observational learning, modeling, and feedback.
- **Feedback Loops:** Behavior change is more likely to take place when individuals are able to observe a new behavior, try it out, and receive constructive feedback on their success. In an actual work setting, learning how to be sustainable is likely to be gleaned from informal interactions with peers and supervisors without explicit feedback provided. Efforts to notice and coach the employee’s sustainability-related efforts are needed to build confidence and encourage commitment.

- **Sustainability at Home:** Employees may be quite familiar with waste management practices at home and in their community. The company can leverage their knowledge and experience gained outside of work by encouraging employees to actively think about the habits they would like to instill in their work day to achieve results both efficiently and sustainably. While peer norms will exert pressure to conform (see Coworker Support, next section), constructive habits practiced outside of work can be modified to fit the work setting and promoted as a valuable contribution.

Boosting Motivation: Perceived Importance, Norms, Personal Role

- **Senior Management Support:** Research suggests that programs aimed at encouraging employees' sense of urgency and commitment to acting sustainably at work can only succeed if senior management clearly indicates their endorsement of this focus. Support can take many forms, from high-level mission language or strategic directives through individual officers demonstrating their commitment by walking the talk with their own actions.
- **Supervisor Support:** Managers and directors within the employee's department have immediate influence on daily tasks and priorities. Supervisors can encourage sustainable choices when setting department and individual goals and when providing performance review feedback. Sustainable behaviors may not be an official dimension of an employee's job description; however, public recognition and overt approval of making sustainable choices can serve an important empowering function within the group.
- **Coworker Support:** As an extension of the manager's direct impact on employee attitudes, peer norms within the group exert tremendous power to shape and motivate employee behavior to "fit in." Peers communicate acceptable and unacceptable parameters of behavior, creating a culture of shared meaning and priorities. Group norms that favor making sustainable choices will motivate new members to learn and internalize similar behavior patterns, to avoid group sanctions or other disruption to the smooth functioning of the group.
- **Sustainability Department:** Companies that invest in staffing a dedicated sustainability function are perceived as "putting their money where their mouth is." The importance and visibility of sustainability within the business is enhanced by attaching specific names and faces to this dimension of the company's performance. In reality, maintaining a sustainability department is only a first step; adequate resources, budget, and authority are needed to develop effective programming and agency for change.
- **Reporting Metrics:** Knowledge of progress toward a goal is a powerful motivator, as suggested by decades of goal-setting theory research. Employees are more inspired to achieve objectives when aspirational targets can be quantified, tracked, and reported back to validate their efforts and celebrate their ultimate success.
- **Competitions:** Goals for reducing waste or resource consumption are inspiring to those employees who are already committed to sustainable behavior. For everyone else, a competition to achieve these goals can be an irresistible attraction. Competitions offer intrinsic and extrinsic rewards above and beyond the value of contributing to the company's wellbeing, in the form of prizes, public recognition, the thrill of victory, and the fun of team comradery. Competitions can be internal, whereby participants can win companywide fame and fortune. In contrast, external competitions may be available by industry or region, whereby the company as a whole may win awards and bragging rights as well as generate company pride, such as Sustainable Pittsburgh's [Sustainable Pittsburgh Challenge](#).

- **Individual Values:** Many job candidates, especially Millennials, value personal growth, authenticity, and self-expression. Environmental responsibility is an increasingly important value, as well, among younger, more educated candidates. A company that demonstrates a sincere commitment to sustainable values will appeal to the type of employee who is inclined to act upon these beliefs in their words and actions. In the short run, hiring engaged employees helps to achieve immediate goals related to waste management or other measures of environmental performance. In the long run, building a critical mass of employees with sustainable values already instilled is a means of transforming the company culture from the inside out.

Boosting Opportunity: Resources, Program Effectiveness, Perceived Commitment

- **Visible Containers:** Making the sustainable choice is more likely to happen when enough resources, such as containers and bins for recycling or composting, are available and conveniently placed in each work area. A sufficient number of bins sends a message that the company is invested in sustainable processes, reinforcing the perception of its importance. Just as importantly, bins and containers must be placed more conveniently than their non-sustainable alternatives so that the sustainable choice has a better chance of becoming the default. Enhanced perceptions and lowered barriers to change are essential drivers of engagement, helping the employee to avoid competing objectives of how to complete a task more efficiently but also sustainably.
- **Processes & Programs:** Visible bins and containers must be accompanied by evidence that the processes and programs associated with them are working as intended. When employees take the time to sort their trash, compost their food scraps, reduce their energy consumption, or use less water, plastic, cardboard, or paper, the assumption is that these efforts will produce positive outcomes. Programs and processes that are mismanaged or misleading won't produce these outcomes, and in turn will undermine the employee's continued participation. Sometimes the program itself is flawed; at other times the program is fine but employees erroneously believe it is flawed. Either way, engagement suffers and must be addressed with corrective action.
- **Job Descriptions:** In an ideal world, all job descriptions would require job tasks to be performed sustainably. Outside of a growing number of companies with sustainability at the heart of their mission (Patagonia, Interface, Method), responsibility for environmental and other sustainable actions is usually up to the employee's discretion, e.g., "extra-role" behavior. The odds of favoring the sustainable option can be enhanced by maximizing its congruence with core job tasks and, if possible, improving upon the non-sustainable alternative. Sustainable actions will prevail when the employee is not forced to choose between sustainability and excelling in his or her work.
- **Industry Conditions:** The nature of the industry and regulatory requirements may constrain the amount and types of sustainability initiatives that can be proposed. Some industries dictate that certain processes are followed to ensure consumer rights, security, information access, conditions of employment, or other legal protections under the law. These processes may take precedence over well-intentioned sustainability goals of reducing paper, energy consumption, or eliminating non-recyclable or hard-to-recycle materials.
- **Facilities/Retrofitting:** Employees may perceive stronger organizational support for sustainability when the building itself is continuously improved with retrofits to help reduce resource consumption. Examples of improvements that communicate the organization's commitment to sustainability include installation of

motion detectors, water-flow controls, automated energy shutoffs, smart climate controls, increased natural lighting, improved insulation, and other retrofits to complement employee efforts.

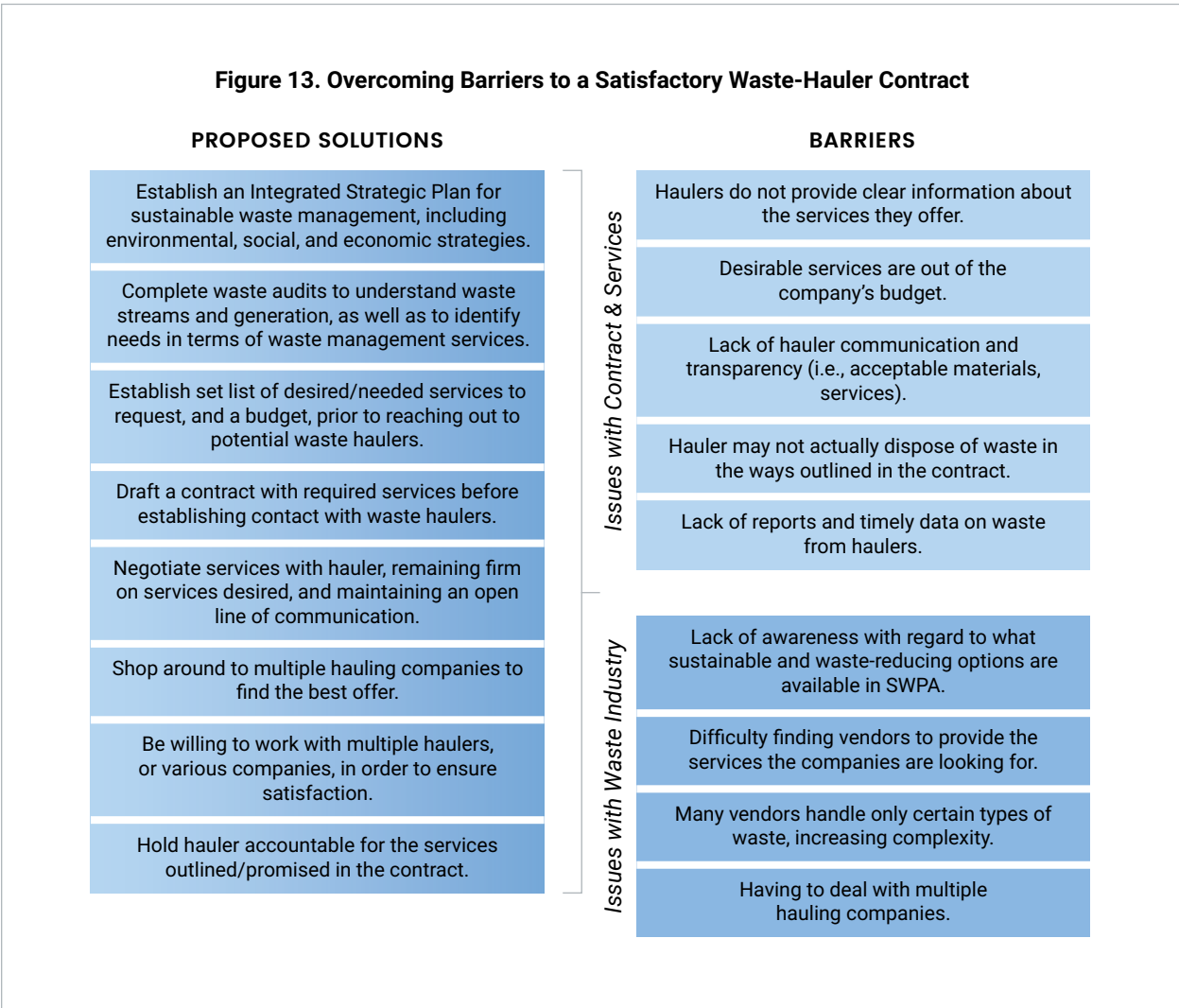
- **External Partnerships:** Internal initiatives to engage employees' hearts and minds in sustainability issues that directly benefit the company can be broadened with comparable external opportunities to make a difference. Employees can develop a deeper understanding of sustainability and a more personal commitment when the issues are generalized to other constituencies, contexts, and causes.
- **Strategic Alignment:** Similar to the notion of identifying sustainability behaviors that are congruent with core job tasks, the company should prioritize sustainability initiatives that are congruent with the company's overall business strategy. This alignment at the strategic level serves as assurance that commitment to sustainability serves the company's ultimate purpose of staying in business and serving its stakeholders' interests. For example, a focus on reducing energy consumption aligns with the strategic mission of a healthcare company by framing the goal of reducing elevator usage in terms of taking the steps, driving less in terms of biking to work, and turning off lights in terms of the health benefits of natural light.

Employee engagement is an effective means for improving a company's waste management performance. Sustainable behaviors are more likely to occur when employee capability, motivation, and opportunity factors are present. Capability is fostered by providing sufficient information, training, and practice to build confidence and knowledge of how to be sustainable at work. Motivation is fostered by intrinsic and extrinsic rewards, perceived program effectiveness, and shared norms. Lastly, the opportunity to be sustainable at work is fostered by robust programs and trust that the company's commitment to sustainability will endure. In short, employee engagement in sustainable waste management is an important and achievable goal given adequate investment in the factors that can translate the best of intentions to concrete action.

FORMING A WASTE-HAULER CONTRACT

The waste service contract is the cornerstone of any successful waste diversion strategy. Wherever possible, it's critical for the organization to use its contracting power to help establish an effective relationship with its hauler.

Businesses often face challenges to effective waste management such as lack of communication in the form of clear information about services, acceptable materials, and reports from waste haulers. Coming to a satisfactory contractual agreement with a waste-hauling company can address these barriers. The model below²¹ outlines proposed solutions to help overcome common barriers and facilitate the desired outcome: acquiring a satisfactory contract with a waste-hauling company.



Source: Dinger et al., 2015.

²¹ Dinger et al., 2015.

Questions to Ask When Negotiating Waste-Hauling Services

In drafting contract language and negotiating services for waste hauling, whether directly with a waste hauler or with a third-party contract manager/aggregator, first establish your organization's desired and required waste services. Then, consider asking a prospective service provider the following questions²² to discern whether it can meet your organization's needs. Although these questions are designed for use with waste haulers, they may be adapted for use with third-party contract managers/aggregators that negotiate on behalf of the waste generator. [Sequoia Waste Solutions](#) and [RoadRunner Recycling](#) are two serving our region.

1. Does your company provide commercial services?
 - a. Will you provide a waste audit or assessment?
 - i. If yes, how do you perform and calculate?
 - ii. Is there a fee for this service?
2. Does your company provide both waste and recycling services?
 - a. What materials would be outlined in a contract?
 - i. What materials do you accept?
 - ii. What materials do you not accept?
3. What locations are included in your service area?
 - a. Are there any limitations to the area(s) in which you provide service?
 - b. Is there an additional cost if we are located outside of your service area?
4. What collection volume is your company capable of handling?
 - a. Is this impacted by seasonal or cyclical changes? *Evaluate whether the company's response to 4 and 4a require you to find additional services or companies to compensate any volume limitations.*
5. What additional services do you provide?
 - a. Do you provide pick-up services, drop-off services, or both?
 - b. Do you provide recycling or waste-collection equipment (e.g., waste or recycling bins, dumpsters, etc.)? Please be specific as to quantity and volume of containers.
 - c. Do you provide education or training opportunities?
 - d. Do you offer payment or profit share for any materials you receive from us?
6. Do you provide services for reporting waste volume and cost reporting?
 - a. If yes, how?
 - i. Do you simply include information as part of billing, or do you manage data via an external database service?
 - ii. If you provide external database services, what platform is used: your own, EPA WARM, ENERGY STAR Portfolio Manager waste, etc.?
 - b. Given the available data, do you provide analytics services for optimizing the customer's cost savings?
7. What type(s) of waste hauling services do you provide: municipal waste to landfill, diversion to single-stream recycling, regulated waste stream management, specialized waste diversion such as commercial composting, etc.? For example, Waste Management offers municipal, commercial bulk, single-stream

²² Ibid.

recycling, cardboard recycling, etc.

- a. How are charges structured for each type of service? For example, what are the factors used to determine cost for each type of service offered?
 - i. If you offer diversion services, how is the diversion rate determined? What is your diversion rate formula?

8. What are your company's values, and how do they align with your services?

9. In what ways does your company partake in sustainable waste disposal methods?

Considerations

Timely, accurate reporting has been difficult to obtain from a majority of waste haulers that operate in Southwestern PA. Potential strategies that may help in getting that information follow:

1. Include reporting requirements in service contracts.
2. Tie receipt of reports to payment. Do not pay invoice until agreed-upon report is received.
3. Ask the waste hauler if technology is available to provide accurate weights of materials in the containers. At a minimum, hauler should know the weight of an empty container.
4. With waste audits, ask the hauler to disclose its actual calculations of weights and diversion rate formulas.

RESOURCES AND TOOLS

Federal Government: Environmental Protection Agency (EPA)

- Reduce/Reuse/Recycle: www.epa.gov/recycle
- Waste Reduction Model – WARM: www.epa.gov/warm
- Sustainable Management of Food: www.epa.gov/sustainable-management-food
- Sustainable Materials Management: www.epa.gov/smm
- WasteWise: www.epa.gov/smm/wastewise
- ENERGY STAR Portfolio Manager: www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager

State

- Pennsylvania Department of Environmental Protection (DEP) – Recycling Program Development and Implementation Grants: www.dep.pa.gov/Business/Land/Waste/Recycling/Municipal-Resources/FinancialAssistance/Pages/Recycling-Program-Development-and-Implementation-Grants.aspx
- Pennsylvania DEP Commercial Recycling Resources: www.dep.pa.gov/Business/Land/Waste/Recycling/Commercial-Resources/Pages/Commercial-Recycling-Resources.aspx
- Pennsylvania DEP Recycling Markets: www.ahs.dep.pa.gov/Recycle_Markets
- Professional Recyclers of Pennsylvania: www.proprecycles.org

County Waste-Diversion Websites, Southwestern Pennsylvania

- Allegheny: www.alleghenycounty.us/Health-Department/Programs/Waste--and-Water-Related/Solid-Waste-Management-and-Recycling/Recycling.aspx
- Armstrong: www.co.armstrong.pa.us/recycling
- Beaver: www.beavercountypa.gov/Depts/WasteMgmt/Pages/default.aspx
- Butler: www.co.butler.pa.us/recycling
- Cambria: www.cambriarecycles.org
- Clarion: www.clarionpa.com
- Fayette: www.co.fayette.pa.us/Recycling/Pages/default.aspx
- Greene: www.co.greene.pa.us/secured/gc2/depts/ed/swr/swr.htm
- Indiana: icswa.indianapa.com/Recycling.aspx
- Somerset: www.co.somerset.pa.us/department.asp?deptnum=178
- Washington: www.co.washington.pa.us/177/Recycling
- Westmoreland: www.westmorelandcleanways.org

Get to Know Pennsylvania Resources Council

A national leader on waste diversion and recycling policy and programs, the nonprofit PRC is an independent resource for organizations, communities and individuals in Pennsylvania:

- Zero-waste technical assistance, including independent audits and analysis, a zero-waste business program, and services for zero-waste events
- Reuse Central, a mobile app connecting donations of materials and goods to not-for-profits who can use them

- Collection events, including the annual ReuseFest
- In-school programs, summer camps, and teacher workshops
- Environmental education, including conservation workshops

To learn more about PRC's extensive services, visit PRC.org.

Local Organizations Accepting Donated Items and Materials

- Brother's Brother Foundation – medical and educational donations: brothersbrother.org
- Construction Junction – reuse of building materials: www.constructionjunction.org
- The Education Partnership – donations of new school supplies or new/gently used office supplies: www.theeducationpartnership.org
- ELoop – IT asset disposition: www.eloopllc.com
- Global Links – medical supplies and some office furniture donations – www.globallinks.org
- Goodwill of Southwestern Pennsylvania – donations of clothing, household items, cars, and more: www.goodwillswpa.org
- Off the Floor – donation of home furniture items and other household items: offthefloorpgh.org/current-ongoing-needs
- Pittsburgh Center for Creative Reuse – creative programming and donations of used art and craft supplies: www.pccr.org
- Reuse Central, a program of the Pennsylvania Resources Council – provides businesses and institutions with a simple tool to conveniently offer their donations to multiple nonprofit organizations: prc.org/2654-2
- The Salvation Army – donations of clothing, furniture, appliances, and toys: wpa.salvationarmy.org

Retailers Offering Assistance with Commercial and Residential Diversion

- AutoZone – oil and batteries
- Batteries Plus – batteries and light bulbs
- Best Buy – appliances and electronics, including rechargeable batteries, wires, cords, and cables, along with plastic bags
- Giant Eagle – clean plastic grocery bags and other plastic film
- Home Depot – rechargeable batteries, CFL bulbs, and incandescent holiday light strings

- Lowes – rechargeable batteries, cell phones, CFL bulbs and plastic shopping bags
- Office Depot – ink and toner cartridges
- Staples – ink and toner cartridges, rechargeable batteries, and many electronic items

Other Resources

- Earth 911: www.earth911.com
- Keep Pennsylvania Beautiful – hosts annual Great America Cleanup of PA: www.keppabeautiful.org
- Recycle Centers: www.recyclingcenters.org
- Recycle Often Recycle Right – education program of Waste Management: recycleoftenrecycleright.com
- Recycle Nation: recyclenation.com
- Responsible Purchasing Network – member-based organization with some materials available as free download: responsiblepurchasing.org/index.php
- West Coast Climate & Materials Management Forum: westcoastclimateforum.com

Waste Service Providers in Southwestern Pennsylvania

This listing of providers is intended as a resource to help users get started. Sustainable Pittsburgh and the authors neither endorse the organizations listed in this guide, nor do they make any claims concerning the accuracy and completeness of the information provided.

Key²³

Materials Accepted

- PPR Paper Products
- PLA Plastic Products
- GLA Glass Products
- MTL Metal Products
- ELE Electronic Products
- BAT Batteries
- BLB Light bulbs
- WOD Wood Products
- RUB Rubber Products
- ORG Organic/Food Waste
- COL Cooking Oil
- APL Appliances
- HAZ Hazardous Waste
- WST Waste
- REC Recycling

Services Provided

- COM Commercial Services
- PKU Pick-Up Services
- DRP Drop-Off Services
- PAY Payment for Products
- MAIL Mail-In Services
- EDU Education on Recycling
- TRN Training on Recycling
- EQP Equipment for Recycling/Waste Services
- DCU Document Destruction
- WSA Waste Audits
- SVL Company has Sustainable/Environmental Values
- CONT Contract Management/Aggregation
- CPST Composting Services

²³ Dinger et al., 2015.

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
National/ Pennsylvania	CJ Poly	Headquarters: 911 Markley Drive Plymouth, IN 46563 866-521-1317	www.cjpoly.com	PLA	COM, PKU, DRP, PAY
	Organix Recycling	Headquarters: 19065 Hickory Creek Drive Mokena, IL 60448 708-326-3900	www.organixrecycling.com	ORG	
	Preserve	Headquarters: 657 Main Street Waltham, MA 02451 888-354-7296	www.preserveproducts.com	PLA	MAIL, DRP
	RoadRunner Recycling	Headquarters: One PPG Place, Fl. 33 Pittsburgh, PA 15222 888-871-7623	www.roadrunnerwm.com	REC, ELE, HAZ, WST	CONT, PKU, COM, EDU, EQP
	Sequoia Waste Solutions	Headquarters: Pittsburgh, PA 412-968-3990	www.sequoiawaste.com	REC, ELE, HAZ, WST	CONT, COM, EQP
	TerraCycle	Headquarters: 121 New York Avenue Trenton, NJ 08638 609-393-4252	www.terracecycle.com	REC	MAIL
Allegheny County	412 Food Rescue	6022 Broad St. Pittsburgh, PA 15206 info@412foodrescue.org	www.412foodrescue.org	ORG	PKU
	AAA Scrap Metal	3315 Penn Avenue Pittsburgh, PA 15201 412-621-3405	www.aaascrapmetal.com	MTL	PAY, DRP, PKU
	Access Corp.	1018 Western Avenue Pittsburgh, PA 15233 412-321-0600	www.accesscorp.com/shredding	PPR	DCU, PKU
	AgRecycle Compost Center	335 N Braddock Avenue Pittsburgh, PA 15208 412-767-7645	N/A	ORG	CPST, COM, PKU, DPP
	AJ Warhola Recycling	339 Chesboro Street Pittsburgh, PA 15212 412-321-1820	N/A	MTL	
	Allegheny Recycled Products	4201 Grand Avenue Pittsburgh, PA 15225 412-331-6704	www.ARPallet.com	WOD	DRP
	American Glass Containers	1001 William Flynn Highway Glenshaw, PA 15116 412-486-9100	www.americanglasscontainers.com	GLA	

²⁴ Ibid.

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	AMG Resources Corporation	Two Robinson Plaza Suite 350 Pittsburgh, PA 15205 412-777-7300	www.amgresources.com	MTL	PAY
	Appliance Warehouse	20 South 6th Street Pittsburgh, PA 15203 412- 381-8800	www.appliancewarehouse.com	APL	
	Atlantic Precious Metal Refining	920 Riverside Place Leetsdale, PA 15056 800-289-9293	www.apmr.com	MTL	
	Batteries Plus	4808 McKnight Road Pittsburgh, PA 15237 412-366-3600	www.batteriesplus.com	BAT, BLB	COM, PKU
	Batteries Plus	402 Home Drive Pittsburgh, PA 15203 412-366-3600	www.batteriesplus.com	BAT, BLB	COM, PKU
	Batteries Plus	3912 Library Road Pittsburgh, PA 15234 412-366-3600	www.batteriesplus.com	BAT, BLB	COM, PKU
	Batteries Plus	3467 William Penn Highway Pittsburgh, PA 15235 412-366-3600	www.batteriesplus.com	BAT, BLB	COM, PKU
	Black Rhino Recycling Inc.	1290 Edgewood Drive Homestead, PA 15120 1-800-974-4669	www.blackrhinoproducts.com	PLA	
	Boyd Roll-Off Services	1200 Railroad Place McKees Rocks, PA 15136 412-331-6830	www.boydrolloff.com	MTL	PAY, PKU
	Bristal Metal Products, Inc.	3000 Lebanon Church Road West Mifflin, PA 15122 412-469-1315	www.bristalmetalproducts.com	MTL	PAY
	Castriota Metals and Recycling	1200 Saw Mill Run Boulevard Pittsburgh, PA 15220 412-431-1832	www.castriotametals.com	MTL	COM, PAY, PKU, DRP
	Castriota Metals and Recycling	1140 McKee Street McKees Rocks, PA 15136 412-331-9000	www.castriotametals.com	MTL	COM, PAY, PKU, DRP
	Casturo Iron & Metal Company	750 W. 5th Avenue McKeesport, PA 15132 412-672-1407	N/A	MTL	
	Construction Junction	214 N Lexington Street Pittsburgh, PA 15208 412-243-5025	www.constructionjunction.org	PPR, GLA, MTL, APL, BAT, BLB	DRP
	D & D Auto Salvage	6375 AVRR Pittsburgh, PA 15201 412-781-9840	www.danddautosalvage.net	MTL	PAY

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Darling International Inc.	3173 Potato Garden Run Rd Imperial, PA 15126 412-659-1212	www.darlingii.com	COL	
	The David J. Joseph Company	Penn Center West #2, Suite 301 Pittsburgh, PA 15276 412-788-6791	www.djj.com	MTL	PAY, SVL
	Diamond Mulch, Inc.	1 Hershey Road Indianola, PA 15051 412-767-8834	www.diamondmulch.com	WOD	DRP
	Dlubak Glass	1600 Saxonburg Roads Natrona Heights, PA 15065 724-224-1099	www.dlubak.com	GLA	
	ELG Metals Inc.	369 River Road McKeesport, PA 15132 412-672-9200	www.elg.de/en	MTL	PAY
	eLoop LLC	625 Plum Industrial Court Pittsburgh, PA 15239 412-519-7646	www.eloopllc.com	ELE	DCU, PKU
	Evolution E-Cycling LLC	2235 Mary Street Pittsburgh, PA 15203 412-390-3450	www.evolutionecycling.com	ELE	DCU, PKU
	Fitzsimmons Metal Company, Inc.	1654 Butler Plank Road Glenshaw, PA 15116 412-486-8587	www.fitzsimmonsmetal.com	MTL	PAY
	Fossil Free Fuel	223 Braddock Avenue Braddock, Pa 15104 412-727-6888	www.fossilfreefuel.com	COL	
	Gateway Recycling	28 Summit Park Dr, Pittsburgh, PA 15275 Phone: 412-837-8777	www.gatewayrecycle.com	PPR, PLA, MTL	COM, PKU, DCU, EQP
	Gipson and Company	5194 State Route 51 Belle Vernon, PA 15012 724-379-4722	N/A	MTL	
	Independent Recycling Services	56 Jaycee Drive Pittsburgh, PA 15243 412-278-0200	www.independentrecycling.com	PPR, PLA	
	Interstate Batteries	103 Sandy Creek Road Verona, PA 15147 412-798-3515	www.interstatebatteries.com	BAT	COM, SVL
	Interstate Batteries	1966 Lincoln Highway North Versailles, PA 15137 412-829-1537	www.interstatebatteries.com	BAT	COM, SVL
	J. A. Rutter Company	4917 Old William Penn Highway Monroeville, PA 15146 724-327-1101	www.jarutter.com	WOD	

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Josh Steel Company	46 6th Street Braddock, PA 15104 412-351-3500	www.joshsteel.biz	MTL	PAY
	Keystone Iron & Metal Co., Inc.	4903 E. Carson Street Pittsburgh, PA 15207 412-462-1520	www.keystoneim.com	MTL	PAY
	Keywell Metals LLC	890 Nobel Drive West Mifflin, PA 15122 412-462-5555	www.keywell.com	MTL	
	Largent's Pallets and Recycling	934 Rt 910 Cheswick, PA 15024 412-377-9021	N/A	WOD	
	Latrobe Recycling, Inc.	3100 Walnut Street McKeesport, PA 15132 412-664-0666	N/A	MTL	
	Liberty Tire Recycling	100 Talbot Avenue Braddock, PA 15104 412-351-5703	www.libertytire.com	RUB	SVL
	Metalico Pittsburgh	3400 Grand Avenue Pittsburgh, PA 15225 412-771-7500	www.metalicopittsburgh.com	MTL	PAY, SVL
	Mon-Valley Recycling Center	51 Will Street McKeesport, PA 15132 412-751-3900	mon-valley-recycling-center.business.site	MTL	COM, PKU, DRP
	Northside Scrap Metals, Inc.	825 Pennsylvania Avenue Pittsburgh, PA 15233 412-321-2058	www.northsidescrapmetals.com	MTL	PAY, PKU
	P. J. Greco and Sons, Inc.	1450 Freeport Road Tarentum, PA 15084 724-224-2424	www.pjgreco.com	MTL	PAY
	Pitt Moss	P.O. Box 54114 Pittsburgh, PA 15244	www.pittmoss.com	PPR	
	Pittsburgh Garden Company and Composting Services	487 Duquesne Drive Pittsburgh, PA 15243 412-651-6528	www.pittsburghgardencompany.com	ORG	CPST, COM, PKU, DRP
	Recycle Source, LLC.	50 Vespuccius Street Pittsburgh, PA 15207 412-421-6000	www.recyclesourcecellc.com	PPR, PLA, GLA, MTL	
	Republic Services	73 Noblestown Road Carnegie, PA 15106 412-436-3521	www.republicservices.com	WST, REC	COM, PKU, WSA, SVL
	Royal Oak Recycling	4830 Grand Avenue Pittsburgh, PA 15225 412-329-2590	www.royaloakrecycling.com	PPR, PLA, MTL, ELE	

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Scott Electric	3901 Butler Street Pittsburgh, PA 15201 412-687-5000	www.scottelectricusa.com	BAT, BLB, ELE	COM, PKU, DRP
	Shred-it	611 E. Pittsburgh McKeesport Blvd North Versailles, PA 15137 412-712-7930	www.shredit.com	PPR, ELE	COM, DCU, PKU, DRP, TRN, SVL
	Stanson Paper Processing, LLC.	876 R. I. Lampus Avenue Springdale, PA 15144 724-275-7285	www.stansonpaper.com	PPR	PAY
	Steel City Soils	920 Braddock Ave. Braddock, PA 15104 412-440-8470	www.steelcitysoils.com	ORG	CPST, COM, PKU, DPP
	Three Rivers Scrap Metal, Inc.	825 Behan Street Pittsburgh, PA 15233 412-322-1155	www.threeriversscrapmetal.com	MTL	PAY, PKU
	TNT Metals	6 30th Street Pittsburgh, PA 15201 412-391-7655	www.tntmetals.org	MTL, ELE	COM, PAY, PKU, DRP
	Tomson Scrap Metal	1100 6th Avenue Brackenridge, PA 15014 412-224-0387	www.tomsonscrapmetal.com	MTL	PAY, PKU
	Tomson Scrap Metal	2100 Karns Road Natrona Heights, PA 15065 412-224-0387	www.tomsonscrapmetal.com	MTL	PAY, PKU
	Tube City IMS	600 Mayer Street Bridgeville, PA 15017 412-257-3433	www.tubecityims.com	MTL	COM, PAY, SVL
	Tube City IMS	12 Monongahela Avenue Glassport, PA 15045 412-678-6141	www.tubecityims.com	MTL	COM, PAY, SVL
	Tube City IMS	516 Delwar Road West Mifflin, PA 15236 412-675-7105	www.tubecityims.com	MTL	COM, PAY, SVL
	Tube City IMS	1300 Braddock Avenue Braddock, PA 15104 412-271-4430	www.tubecityims.com	MTL	COM, PAY, SVL
	Verona Iron & Metal	718 Plum Street Veron, PA 15147 412-828-3440	N/A	MTL	
	Waste Management	3100 Hill Road Library, PA 15129 (800)-458-4090	www.wm.com	WST, REC	COM, PKU

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Waste Management–Greenstar Recycling	4100 Grand Avenue Pittsburgh, PA 15225 412-250-0275	www.wm.com	PPR, PLA, GLA, MTL	DCU, EDU, WSA
	Wimco Metals, Inc.	401 Penn Avenue Pittsburgh, PA 15221 412-243-8000	N/A	MTL	
	Wood Waste Recycling	43 Prestley Road Bridgeville, PA 15017 724-695-1000	www.woodwasterecycling.com	WOD	PKU
Armstrong County	Armstrong County Recycling Center	139 Armsdale Road Kittanning, PA 16201 724-548-3223	www.co.armstrong.pa.us/recycling	PPR, PLA, GLA, MTL	DRP
	Leechburg Borough Recycling Center	Municipality 260 Market Street Leechburg, PA 15656 724-854-9721	www.leechburgpa.org/pubworks.html	PPR, PLA, GLA, MTL	DRP
	Lower Kiski Recycling	153 Main Street Leechburg, PA 15656 724-842-8501	N/A	PPR, PLA, GLA, MTL	DRP
	P. J. Greco and Sons, Inc.	293 Tarrtown Road Kittanning, PA 16021 724-543-1052	www.pjgreco.com	MTL	PAY
Beaver County	Allegheny Raw Materials, Inc.	136 Sara Drive Ellwood City, PA 16117 724- 752-1161	www.alleghenyrawmaterials.com	MTL	PAY, DRP
	Brunner Disposal	211 Brunner Road Zelienople, PA 16063 724-775-6665	www.brunnerdisposal.com	WST, REC	PKU, DRP
	Cronimet Holdings / Cronimet Trading	1 Pilarsky Way Aliquippa, PA 15001 724-375-5004	www.cronimetusa.com www.cronimettrading.com	MTL	
	Metalico Pittsburgh/Skip's Recycling	2003 Crows Run Road Conway, PA 15027 724-770-9110	www.metalico.com	PPR, MTL	PAY, SVL
	PSC Metals, Inc.	Westgate Drive Beaver Falls, PA 15010 724-846-9400	www.pscmetals.com	MTL	PAY
	PSC Metals, Inc. / Aliquippa Recycling	12 Woodlawn Road Aliquippa, PA 15001 Phone:724-378-3734	www.pscmetals.com	MTL	PAY
	PSC Metals, Inc. / Luria Brothers and Company	New Route 18 Beaver Falls, 15011	www.pscmetals.com	MTL	PAY

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Waste Management - Ambridge Hauling & Transfer Station	2097 Duss Avenue Ambridge, PA 15066 800-866-4460	www.wm.com	WST, REC	
Butler County	A & B Salvage	112 Little Yellowcreek Road Harmony, PA 16037 724-452-5865	N/A	MTL	
	Butler County Recycling	124 W Diamond Street Butler, PA 16001 Phone: (724) 284-5305	www.co.butler.pa.us/recycling	PPR, PLA, GLA, MTL, WST, REC	PKU
	ECS&R	129 Ash Stop Road Evans City, PA 724-432-3278	www.ecsr.net	WST, HAZ, ELE	TRN, DRP
	Gateway Recycling	412 Halstead Boulevard Zelienople, PA 16063 412-837-8777	www.gatewayrecycle.com	PPR, PLA, MTL	COM PKU, DCU, EQP
	MRC Scrap Metals	201 Kittanning Street Butler, PA 16002 724-285-5865	www.mrcscrapmetals.com	MTL	PAY
	PSC Metals, Inc. / Slippery Rock Recycling	656 New Castle Road Slippery Rock, PA 16057 724-794-6129	www.pscmetals.com	MTL	PAY
	RBW Technologies, Inc.	433 Hartmann Road Evans City, PA 16033 724-452-8440	www.rbw.com	PLA	PAY
	Tri-County Recycling, LLC.	120 Hutchman Road Mars, PA 16046 724-625-9000	www.tcrecycling.com	REC	COM, PKU
	Vogel Disposal Services	121 Brickyard Road Mars, PA 16046 724-625-1511	www.vogeldisposal.com	WST, REC	COM, PKU
Cambria County	Buckhorn Recycling & Compost Facility	Ashville, PA 16613 814-942-7472	www.ircenvironment.org/composting/buckhorn-recycling-compost-facility	REC, WOD, ORG	DRP, CPST
	Cambria County Solid Waste Authority	507 Manor Drive Ebensburg, PA 15931 Phone: 814-472-2109	www.cambriarecycles.org	WST, REC, ELE	PKU, EDU
	Elias Scrap Metal	214 Double Dam Road Barnesboro, PA 15714 814-948-9100	N/A	MTL	

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Keystone Electronics Recycling	814-244-3983	N/A	ELE	PKU
Clarion County	Advanced Disposal	18380 Paint Boulevard Shippensburg, PA 16254 (800)-338-8971	www.advanceddisposal.com/pa	WST, REC	COM, PKU, EDU
	P.J. Greco and Sons, Inc.	2220 Route 322 Corsica, PA 15829 814-379-3217	www.pjgreco.com	MTL	PAY
Fayette County	Advanced Disposal	1192 McClellandtown Road McClellandtown, PA 15458 724-437-7336	www.advanceddisposal.com/pa	WST, REC	COM, PKU, EDU
	Metalico Brownsville/ Assad Iron & Metals, Inc.	1046 Brownsville Road Brownsville, PA 15417 724-785-6000	www.metalico.com	MTL	PAY, SVL
	B & R Recycling	145 Bellview Road Connellsville, PA 15425 724- 628-1298	N/A		
	CAP Glass, Inc. (Carry All Products)	P.O. Box 201 Connellsville, PA 15425 724-547-4550	www.capglassrecycling.com	GLA	
	Goodwill Industries Recycling Station	105 Romeo Lane Uniontown, PA 15401 724-437-9987	www.goodwillswpa.org	PPR, PLA, GLA, MTL	COM, SVL
	Kubina Metals	672 Braznell Road Grindstone, PA 15442 724-785-6190	N/A	MTL	
	Owensdale Scrap and Recycling, Inc.	551 Broadford Road Connellsville, PA 15425 724-628-1960	N/A	MTL	
	Platt Recycling / Metalico	96 Oliver Road Uniontown, PA 15401 724-438-2091	www.metalico.com	MTL	PAY, SVL
	Route 51 Iron & Metal	907 Old Route 51 Road Smock, PA 15480 724-677-2424	www.rt51metals.com	MTL	COM, PAY, PKU, DRP
	Simyak Scrap Iron and Metal	131 Knobb Road Brownsville, PA 15417 724-785-8822	N/A	MTL	
	Tube City IMS	891 Mills Lane Belle Vernon, PA 15012 724- 929-4515	www.tubecityims.com	MTL	COM, PAY, SVL
Greene County	Greene Arc, Inc.	197 Dunn Station Road Prosperity, PA 15329 724-627-5511	greenearc.org	PPR, PLA, GLA, MTL	DRP

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Greene Team Pellet Fuel Company	150 Carmichaels Road Carmichaels, PA 15320 724-966-2166	www.greeneteampellets.com	WOD	
	Jack's Recycling	226 Mt. Morris Road Mt. Morris, PA 15349 724-324-2707	www.jacksrecycling.net	MTL	
	Levine Iron & Metal, Inc.	514 W. High Street Waynesburg, PA 15370 724-627-5939	N/A	MTL	
	Rohanna Iron & Metal	100 T506 Avenue Waynesburg, PA 15307 724-627-3164	N/A	MTL	
Indiana County	Indiana County Solid Waste Authority	Municipality 1715 Route 119 South Homer City, PA 15748 724-479-0444	icswa.indianapa.com	PPR, PLA, GLA, MTL, ORG	DRP
	Prime Metals & Alloys, Inc.	101 Innovation Drive Homer City, PA 15748 724-479-4155	www.primemetals.net	MTL	PAY
	RSM Company	527 S. 13th Street Indiana, PA 15701 724-465-4381	www.rsmcompany-steel.com	MTL	PAY, DRP
	Waste Management	4562 Rte 119 South Homer City, PA 15748 800-458-4090	www.wm.com	WST, REC	
	Weimer's Scrap Metals	5473- 5593 State Route 3003 Clarksburg, PA 15725 724-459-6694	N/A	MTL	
Somerset County	Burgmeier's Hauling	1356 Old Sixth Avenue Rd. Altoona, PA 16601 1-800-491-8975	www.burgmeiers.com	DCU, PKU	
	G. M. Honkus and Sons, Inc.	2030 Seanor Road Windber, PA 15963 814-467-4354	N/A	MTL	
	JVS Environmental	1466 Cornerstone Road Friedens, PA 15541 877-735-3178	www.jvsenvironmental.net	ELE	DCU, PKU, SVL
	Kantner Iron & Steel, Inc.	3825 Whistler Road Storystown, PA 15563 814-893-5668	www.kantneriron.com	MTL	PAY
	Kantner Iron & Steel, Inc.	151 Listie Road Friendens, PA 15541 814-445-6559	www.kantneriron.com	MTL	PAY
	Rollock, Inc.	3179 Lincoln Highway Storystown, PA 15563 814-893-1353	www.rollockinc.com	MTL	PAY

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Somerset County Recycling	Municipality 300 North Center Ave Suite. 540 Somerset, PA 15501 814-445-1544	www.co.somerset.pa.us	REC	DRP
	Total Recycling	166 Guardian Boulevard Boswell, PA 15531 814-629-5675	N/A	PPR,PLA, GLA, MTL	
	Valley Proteins, Inc.	275 Alisa Street Somerset, PA 15501 814-443-3514	www.valleyproteins.com	ORG	SVL
Washington County	Brookman Iron and Metals	4 Race Street Washington, PA 15301 724-222-4260	www.brookmanironandmetals.com	MTL	PAY
	Canon-Mac Metals	2329 Hill Church Houston Road Cannonsburg, PA 15317 724-745-6544	N/A	MTL	
	General Alloys, Inc.	135 W. Wylie Avenue Washington, PA 15301 724-223-1700	www.generalalloys.com	MTL, BAT, ELE	
	Heritage Environmental Services—Solid Oak	159 S. Johnson Road Houston, PA 15342 724-873-5736	www.heritage-enviro.com	HAZ	COM, PKU, TRN, SVL
	Mail Boxes Plus More	123 Washington Street Washington, PA 15301 724-222-7660	N/A	PPR	
	Monongahela Iron & Metal Company	613 E. Main Street Monongahela, PA 15063 724-258-7400	mimcorecycling.com	MTL	
	Washington Penn Plastics Company, Inc.	450 Racetrack Road Washington, PA 15301 724-228-1260	www.washingtonpennplastic.com	PLA	
	Waste Management Arden Landfill	200 Rangos Lane Washington, PA 15301 800-458-4090	www.wm.com	WST, REC	COM, PKU
	Wood Waste Recycling	111 Kelso Road McDonald, PA 15057 724-695-1000	www.woodwasterecycling.com	WOD	
Westmoreland County	Alfieri Scrap Metal Company	10830 Glass Street Irwin, PA 15642 724-861-5091	N/A	MTL	
	Allegheny Paper Shredders Corporation	Old William Penn Highway East Delmont, PA 15626 724-468-4300	www.alleghenyshredders.com	PPR	DCU
	AMD Paper Salvage	5 Forbes Road Trafford, PA 15085 412-400-1150	www.recyclesearch.com/ profile/33736	PPR	

WASTE SERVICE PROVIDERS IN SOUTHWESTERN PENNSYLVANIA²⁴ See [page 37](#) for key.

Location/ Service Area	Company	Contact	Website	Materials Accepted	Services Provided
	Atwater Steel Trading Corporation	Bridgeport Road Mt. Pleasant, PA 15666 724-542-7709	N/A	MTL	
	Bradish Glass, Inc.	44 Willow Crossing Road Greensburg, PA 15601 724-837-5100	www.bradishglass.com	GLA	
	Braeburn Alloy Steel	101 Braeburn Road Lower Burrell, PA 15068 724-224-6900	www.braeburnsteel.com	MTL	PAY
	City of Jeannette	Municipality 4th Street & Brickell Avenue Jeannette, PA 15644 724-527-4000	www.cityofjeannette.com	PPR, GLA, MTL	
	Daniels and Miller, Inc.	242 N. Hamilton Avenue Greensburg, PA 15601 724-834-1500	www.danielsandmiller.com	MTL	PAY
	Designed Alloy Products, Inc.	1 Imagine Lane Derry, PA15627 724-694-3004	www.designedalloys.com	MTL	PAY
	Grandview Nurseries, Inc.	119 Tolvinski Lane Irwin, PA 15642 724-446-7673	www.grandviewnurseriesinc.com	WOD	
	Kalumetals, Inc.	116 Pittsburgh Street Derry, PA 15627 724-694-2800	www.kalumetals.com	MTL	PAY
	Loyalhannah Valley Recycling Center	Municipality 110 Andi Lane Ligonier, PA 15658 724-238-7560	www.loyalhannawatershed.org	PPR, PLA, GLA, MTL	
	OPCO, Inc.	253 W. Harrison Avenue Latrobe, PA 15650 724-537-9300	www.opcodirect.com	PLA	SVL
	Republic Services	234 Landfill Road Scottsdale, PA 15683 724-887-9400	www.republicservices.com	WST, REC	COM, PKU, WSA, SVL
	Scott Electric	1000 South Main Street Greensburg, PA 15601 724-834-4321	www.scottelectricusa.com	BAT, BLB, ELE	COM, PKU, DRP
	Stanko Products	278 Donohoe Road Greensburg, PA 15601 724-834-8080	www.stankoproducts.com	MTL	
	Waste Management	310 Leger Road North Huntingdon, PA 15642 800-458-4090	www.wm.com		
	Westmoreland Cleanways Recycling Center	113 Innovative Land Latrobe, PA 15650 724-879-4020	www.westmorelandcleanways.org	PPR, PLA, MTL	DRP

Tool for Summarizing Waste-Diversion Options

Context Scope

To be sustainable, one should attempt to divert residual materials/products as much as possible to reduce the volume of “true” waste. Waste materials/products no longer have value as determined by need and use. **In contrast, residual materials or products²⁵ have value.** The challenge is that the value may not reside within your organization or be related to the original use. *Where value is found*, a means of recovery through diversion enables extended material/product life. Diversion can occur in multiple ways:

- Reuse: use in original form for same purpose.
- Repurpose: new use or disassembly/deconstruction to reuse parts.
- Recycle: destruction to extract material that will be reused.
- Upcycle: creative repurposing of materials.
- Compost: biodegradation into useful agriculture resource.
- Waste to energy – incineration or similar technology: burning at a very high temperature to reclaim energy.
- Anaerobic digestion: biodegradation to produce heat and natural gas resources for energy.

Consideration of end-of-use diversion should be part of a procurement process that assesses “total cost of ownership” in addressing the purchase, use, and disposal of materials and products. Diversion contributes to a circular economy. (See [Material Economy Continuum](#) section for more about total cost of ownership and a circular economy.)

Evaluating Prospects for Resale and Asset Disposition

RESALE is a means to an end. It is a non-distinct, repeatable, intermediate action that can be associated with the diversion (end-point) options described in this section. For example, reselling of products and materials can occur as part of reuse, repurposing, recycling, etc.

ASSET DISPOSITION is a special case of reuse, repurposing, and recycling. The significance is *realizing a financial benefit* of the market value of a product or its material. Asset disposition occurs through reselling all or part of a product. For example, a precision imaging instrument that retains its market value of \$5 million and its market demand, after seven years of use, is an asset that can be resold. In another example, rare earth metals such as scandium or neodymium contained in the circuit board of a consumer-based, wireless technology retains its market value, but the circuit board and whole wireless technology product do not. Therefore, as materials, the rare earth metals are assets that are recoverable through dismantling the wireless technology and reselling the subcomponents of a circuit board.

²⁵ The terms “materials” and “products” are not interchangeable, but are related. A product, such as a vehicle, a computer system, or a phone, may have residual value as a whole object or as a composite of interchangeable subparts that have value. A material, such as plastic, metal, or glass, may have residual value regardless of the product. Sometimes, its material has greater value than a product; for example, titanium and platinum, which are materials used in wireless technology, have greater value than the devices that contain them. Thus, when considering diversion, both perspectives should be investigated.

Contributing Partners at Your Organization

Valuation of or assigning value to residual materials/products is a generalized version of “asset management,” where as part of asset decommissioning, high-cost, durable products/technology are recovered for resale or trade. Valuation of residual materials/products is often managed through the following organizational departments:

- **Supply Chain/Procurement/Purchasing**
- **Finance**
- **Facilities Management**
- **Sustainability** (which may be included in one of the above departments, on its own, or within another)

To make effective decisions, these departments require expert insight regarding the broad-based value of residual materials, residual parts, and the whole, residual product. The expertise often comes from **users of the product/material**, who should have been involved in the initial purchase. Additionally, **manufacturers** know best the possible variety of applications and durability of their materials and products. Beyond users and manufacturers, external organizations may exist to assist with identifying diversion options. A community-based nonprofit involved in material diversion or a “scrap materials” recovery business can assist with diversion. Many online auction sites for industrial companies will give you a sense of the product or material needs across many industries. In summary, **strategically, a sustainability coordinator should work closely with his or her supply chain/procurement/purchasing departments, which have access to the other indicated partners and would set up the diversion service contracts.**

Resource Description and Directions

A summary chart framing diversion options can assist the informed decision making of product users and purchasers. The tool is intended to accommodate easy look-up and quick decision making by the organization’s employees at the instance and location of waste creation. It should be designed to be usable by all employees, at all levels of familiarity with waste management procedures. Ideally it might be a quick reference card that is frequently updated for accuracy.

Table 2 shows an example of a simplified diversion summary tool. Note that the content shown in this example is for illustration purposes only; actual data should be based on the specific facility’s locality.

Any spreadsheet program such as Excel can be used to replicate the chart. In the title row, list the diversion options as qualitative questions, and list the waste (“material”) stream in the first column. For this example table, we use indicated waste streams from the unpublished manuscript by Chatham University students.²⁶ The columns address whether a characterized waste stream can be diverted, and the subsequent columns address possible diversion options. **The qualitative responses in each cell should reflect consensus-based understanding among stakeholders.**

²⁶ Dinger et al., 2015.

Table 2. Tool for Summarizing Diversion Options
(Sample for illustration purposes only)

Waste Stream	Are these divertable? Y/N	Reuse? Y/N/M	Repurpose? Y/N/M	Recycle? Y/N/M	Upcycle? Y/N/M	Compost? Y/N/M	WtE: Incineration? Y/N/M	Anaerobic digestion? Y/N/M
Plastic (1)	Y	Y	Y	Y	Y	M	N	N
Aluminum and other metal cans and bottles (2)	Y	Y	Y	Y	Y	N	N	N
Glass (3)	Y	Y	Y	Y	Y	N	N	N
Scrap Metal (4)	Y	Y	Y	Y	Y	N	N	N
Office Paper (confidential) (5)	Y	N	N	Y	N	M	Y	N
Office paper (non-confidential), Newspapers/Magazines (6)	Y	Y	Y	Y	Y	M	Y	N
Cardboard (7)	Y	Y	Y	Y	Y	M	Y	N
Compostable/Organic Waste (8)	Y	N	N	N	N	Y	Y	Y
Cooking Oil (9)	Y	N	N	Y	N	N	Y	N
Electronics (10)	Y	M	M	Y	N	N	N	N
Universal Waste: Batteries, Fluorescent Bulbs/Tubes, Ballasts (11)	M	N	N	M	N	N	N	N
Paper Towels (12)	M	N	N	N	N	N	Y	N
Chemicals (Cleaning Supplies, Paints, Oils, Solvents, Etc.) (13)	Y	N	N	N	N	N	Y	N
Pallets (whole or broken) (14)	Y	Y	Y	Y	Y	N	Y	N
Toner Cartridges (15)	Y	M	N	M	N	N	Y	N
Vehicles (whole or components such as tires and batteries) (16)	Y	N	Y	M	N	N	N	N
Styrofoam (17)	M	M	N	M	Y	N	Y	N
Plastic Bags & Other Film (18)	M	N	N	N	N	N	Y	N
Textiles (Linens, Rags, Etc.) (19)	Y	Y	N	M	Y	N	Y	M
Aseptic Containers (Standard Juice and Milk Carton Containers) (20)	M	N	N	N	N	N	Y	N

Possible qualitative responses:

- **Y**= Yes
- **N**=No
- **M**=Maybe (conditions apply)

If a “Yes” or “Maybe” is indicated, the user should conduct a feasibility study of operational support needed to enable diversion.

NOTE: A row with all “No”s indicates a “true” waste stream that must be addressed through disposal options of landfill or incineration. The material is removed permanently from the market. An example of a “true” waste stream is a hazardous waste, such as lead-based paint, asbestos-containing tiles or paneling, or a banned material such as lead gasoline, chlorofluorocarbon aerosols, or DDT powders, that may not be reintroduced or maintained as part of a materials market because it is too risky/dangerous for diversion.

Timing will play a part in potential responses. If one has not yet committed to service contracts for a particular waste stream, then all three qualitative responses may be possible. If one is **reviewing one’s current state of diversion with services under contract**, most responses will be either a “yes” or “no”; a “maybe” would indicate a change of service, where a waste-diversion vendor chooses to change its services to offer a diversion option.

Demonstration of the Tool’s Application

To advance the value of this tool, the user needs additional information. For each waste stream deemed able to be diverted, the user must research to identify possible diversion options. Two examples of this vetting process follow:

Diversion Tool Row: Waste Stream: Expanded Polystyrene (aka Styrofoam)

Waste Stream	Are these divertable? Y/N	Reuse? Y/N/M	Repurpose? Y/N/M	Recycle? Y/N/M	Upcycle? Y/N/M	Compost? Y/N/M	WtE: Incineration? Y/N/M	Anaerobic digestion? Y/N/M
Styrofoam (17)	M	M	N	M	Y	N	Y	N

Expanded polystyrene (EPS) is a plastic *material* that can be part of a product or comprise a product itself. It is often used as insulation and temperature-stabilizing material. It can be found in housing material, used as a shipping container, and used as shipping material. More often, it is used as a hot or cold beverage container or food service container. If it is not marred, discolored, or permanently soiled, EPS can be:

- **Reusable** in its original form, such as shipping coolers or insulation packing planks.
- Creatively **upcycled** through cutting, melting, and reshaping into new products.
- **Recycled** into a lower-grade material that is still functional with the same usage properties. (One major ESP recycler serving all of North America is [CJ Poly.](#))

If the EPS is marred, discolored, or permanently soiled, then it can be used as **fuel for an incineration-based** waste-to-energy plant. It can also be dissolved and recycled.

Diversion Tool Row: Waste Stream: Toner Cartridges

Waste Stream	Are these divertable? Y/N	Reuse? Y/N/M	Repurpose? Y/N/M	Recycle? Y/N/M	Upcycle? Y/N/M	Compost? Y/N/M	WtE: Incineration? Y/N/M	Anaerobic digestion? Y/N/M
Toner Cartridges (15)	Y	M	N	M	N	N	Y	N

In contrast to EPS, a toner cartridge is a *product*. More specifically, it is a subcomponent of a printer, copier, or multifunction-optical machine (MFO). Most are made of hardened plastic, with some metal parts to contact and enable technological controls, and contain a powder or liquid ink. None of these cartridge components is recyclable independently. However, *if designed for reuse*, a toner cartridge can be **reused through reverse-distribution “recycling”** by the original equipment manufacturer (OEM). One would send the empty toner cartridge back to the OEM to refill and redistribute, resulting in avoided waste. Alternatively, a toner cartridge can be **fuel for incineration** in a waste-to-energy plant.

Takeaway

Table 2 is an example to assist you in creating a tool specific to your own organization. Depending on geography, local services, and materials markets, the answers can certainly vary. *When a product or material no longer has use within your organization, do not assume/determine that it is “waste.”* It can have residual value, although realizing and enabling that value may require some effort. The effectiveness of this tool is best when partners participate in a process of identifying “end of use” value and options. Zero waste is possible with continued effort.

Be aware that though an option may exist, the effort to divert may be operationally prohibitive. For example, the organization may require additional staff, equipment, and logistics costs to enable recovery for diversion. These factors should be weighed against the return on equity (ROE) associated with the organization, where equity is a key stakeholder’s perception of the organization’s demonstration of social responsibility.

Tool for Summarizing Applicable Regulations

Context Scope

Some waste streams are regulated. Based on the type of material used in a product or packaging and its associated risk, regulations may exist at the federal, state, and local levels. More regulations occur at the state and local levels than the federal level. This can complicate efforts to establish services and operations for multi-county and multistate organizations.

Regulations may limit the means and/or timing of a waste stream’s disposal. These limitations can affect cost if a qualified service provider is not located in close proximity. Waste stream regulations primarily involve transportation, storage, and disposal, known as TSD. Aspects of TSD that can influence cost of waste stream management include:

- If transportation requires special collection and shipping containers, or specialized transportation vehicles;
- If storage requires geographic limitation to residential or commercial areas, or environmentally controlled facilities;
- If the disposal method is unique and complicated, resulting in licensure to operate and rarity of operational facilities.

Additionally, regulations may require specialized on-site storage licenses and service operator licenses.

In summary, being aware of regulations that reflect preventive risk management of waste streams is critical.

Contributing Partners at Your Organization

Parties that may have an interest in waste stream regulations (listed alphabetically) include the following:

- **Environmental, Health and Safety:** manage regulated waste stream manifest
- **Janitorial/Custodial/Environmental Support services:** often the people internally who may pick up and move waste
- **Facilities Management:** provide space for collection storage and controlled access to regulated streams
- **Supply Chain/Procurement/Purchasing:** identify and vet waste stream service providers and implications of cost structures
- **Legal Department:** provides legal services for the organization inclusive of review of both civil and criminal litigation cases; negotiation of reconciliations; regulation monitoring, review and interpretation; lobbying services; etc.
- **Sustainability Coordinators:** assess and identify waste diversion options

Depending upon your organization/industry, additional partners may exist. These parties may be internal to your organization, consultants, or contracted service providers. Each provides a distinct perspective that must be considered to derive a well-rounded, consensus response.

Resources for Legal Support

Medium, small and startup businesses may not have access to continuous legal support to address and review regulations and governmental policy as they occur. Possible ways to address this challenge include:

1. Maintaining a membership in an industry or professional organization, which often may include regulatory monitoring and summaries of concern and position statements, e.g., [Professional Recyclers of Pennsylvania](#)
 - a. Some organizations may be state- or local-based: e.g., [Pittsburgh Technology Council](#)
2. Attending community development and planning meetings
3. Receiving regulatory newsletters from federal, state, and local entities, e.g., [Pennsylvania Department of Environmental Protection newsletter](#)

4. Establishing a relationship with a regional university law clinic

a. Benefits to consider:

- i. Low to no overhead costs
- ii. Adequate assistance to identify and frame a relevant regulation or policy
- iii. Current information

b. Drawbacks to consider:

- i. Lack of industry specialization and expertise
- ii. Inability to assist with developing an advance response if needed

In Southwestern Pennsylvania, the following academic law clinics may assist with addressing regulatory monitoring only:

- [Duquesne University Small Business Development Center](#)
- [University of Pittsburgh Law School Clinics](#)
- [Pennsylvania State University Law School Clinics](#)

Resource Description and Directions

With so many stakeholders having an interest in waste stream regulations, all parties can benefit from a summary chart framing types of regulation at various scales. Such a tool is intended to accommodate easy look-up and quick decision making by the organization’s employees at the instance and location of waste creation. It should be designed to be usable by all employees, at all levels of familiarity with waste management procedures. Ideally it might be a quick reference card that is frequently updated for accuracy.

Table 3 shows an example of a simplified tool for summarizing applicable regulations. Note that the content shown in this example is for illustration purposes only; actual data should be based on the specific facility’s locality.

Any standard spreadsheet program such as Excel can be used to replicate the chart. In the title row, list the issues/goal such as qualitative questions, and list the waste stream in the first column. For demonstration, this table uses indicated waste streams from the Chatham University report.²⁷ The columns address whether a characterized waste stream is regulated and at what level (for this hypothetical site). **The qualitative responses in each cell should reflect consensus-based understanding among stakeholders.**

Table 3. Tool for Summarizing Application Regulations
(Sample for illustration purposes only)

Waste Stream	Is this regulated? Y/N	Federal? Y/N	State? Y/N	County? Y/N	Local (City, Borough, Etc.)? Y/N
Plastic (1)	N	N	N	N	N
Aluminum and Other Metal Cans and Bottles (2)	N	N	N	N	N
Glass (3)	N	N	N	N	N
Scrap Metal (4)	N	N	N	N	N
Office Paper (confidential) (5)	Y	Y	N	N	N
Office paper (non-confidential), Newspapers/Magazines (6)	N	N	N	N	N
Cardboard (7)	N	N	N	N	N
Compostable/Organic Waste (8)	Y	N	Y	N	N
Cooking Oil (9)	N	N	N	N	N
Electronics (10)	Y	N	Y	N	N
Universal Waste: Batteries, Fluorescent Bulbs/Tubes, Ballasts (11)	Y	Y	N	N	N
Paper Towels (12)	N	N	N	N	N
Chemicals (Cleaning Supplies, Paints, Oils, Solvents, Etc.) (13)	Y	Y	Y	N	N
Pallets (whole or broken) (14)	N	N	N	N	N
Toner Cartridges (15)	N	N	N	N	N
Vehicles (whole or components such as tires and batteries) (16)	Y	Y	Y	N	N
Styrofoam (17)	N	N	N	N	N
Plastic Bags & Other Film (18)	N	N	N	N	N
Textiles (Linens, Rags, Etc.) (19)	N	N	N	N	N
Aseptic Containers (Standard Juice and Milk Carton Containers) (20)	N	N	N	N	N

²⁷ Dinger et al., 2015.

In general, the greater a material’s potential risk and prevalence of use, the more likely the governing-level regulation will be higher. If a waste stream is regulated at the federal level, then an associated broad-based public health risk has been determined to warrant the regulation.

Demonstration of the Tool’s Application

To advance the value of this tool, the user needs additional information. For each waste stream determined to be regulated, the user must research to identify all possible regulations at the indicated governing levels. Two examples of this vetting process follow.

Row from Summary Tool: Waste Stream: Electronics

Waste Stream	Is this regulated? Y/N	Federal? Y/N	State? Y/N	County? Y/N	Local (City, Borough, Etc.)? Y/N
Electronics (10)	Y	N	Y	N	N

A state-level regulation exists. Consider what state departments are likely associated with this regulation:

- [Pennsylvania Public Utility Commission](#)? This department manages/regulates utility operation and service within Pennsylvania.
- [Pennsylvania Department of Health](#)? This department oversees public health risk, health service operations management, and coordinated responses to emergency and disaster management in Pennsylvania.
- [Pennsylvania Department of Environmental Protection](#)? This department addresses human exposure risks associated with air, water, and land in Pennsylvania. It regulates waste through rules such as the [Covered Device Recycling Act](#).

To protect human health and the environment from the toxic substances in electronic waste, while managing the socio-economic opportunities involved in reusing and recycling valuable substances and parts remaining in discarded equipment, many nations and industries monitor the flow of e-waste through frameworks like the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal or through traceability schemes such as the GS1 standards. As a testament to their success, other industries are adopting similar supply chain mapping approaches.

NOTE: If a waste stream is well-defined, the task of identifying association should be easy and sensibly logical. In contrast, if a waste stream is poorly defined, the task becomes complex, as in the following example.

Row from Summary Tool: Waste Stream: Vehicles

Waste Stream	Is this regulated? Y/N	Federal? Y/N	State? Y/N	County? Y/N	Local (City, Borough, Etc.)? Y/N
Vehicles (whole or components such as tires and batteries) (16)	Y	Y	Y	N	N

A vehicle is a single object with multiple parts; each part is possibly a separate waste stream based on its material. While the whole vehicle itself may not be regulated, some of the part-based waste streams are regulated. *Consequently, to be proactively compliant, the user should determine that YES, a vehicle is a regulated waste stream.* For example, three subcomponents of a vehicle that are regulated waste streams are the tires, the

battery, and all fluids (chemicals). These are regulated at two different governing levels: federal and state.

Possible regulating federal department and agencies:

- [U.S. Department of Transportation](#): provides guidance on vehicle decommissioning process
- [National Highway Traffic Safety Administration](#): addresses safe operation of vehicles (recalls and market/operation removals) and vehicle decommissioning associated with accidents
- [U.S. Environmental Protection Agency](#): regulates waste streams associated with specific components as part of vehicle decommissioning

Possible state regulation departments:

- [Pennsylvania Department of Transportation](#): regulates vehicle decommissioning within Pennsylvania, based on what support is available within the state
 - [Department of Motor Vehicles](#)
- [Pennsylvania Department of Environmental Protection](#): regulates waste streams associated with specific components as part of vehicle decommissioning, based on what support is available within the state

Takeaway

In summary, to avoid regulatory noncompliance, one should be aware of what waste streams are regulated at a governing level. The effectiveness of this summary tool is best when partners participate in the process of identifying waste streams and possible associated regulations. As part of determining a consensus-based response, the following should be considered: the governing-level (i.e., federal, state and/or local) regulation, which departments or agencies are involved with regulating the product(s), and **which one has the greater jurisdiction relative to your industry and product used**. *In general, the greater the jurisdictional influence, the greater the regulatory threat. Please understand that this tool is at the summary level; the specific applicable regulations for waste streams may have requirements in the hundreds or thousands of pages. When in doubt, legal counsel should be involved.*

Purchasing Decision Flowchart

There are two opportunities for managing an organization's waste responsibly: the upstream and downstream materials-handling processes. The following charts outline a series of questions and considerations that sustainability coordinators and materials managers should review before and after a product or service is selected for their organization.

Sometimes the easiest way to manage waste is to avoid creating it in the first place. The first flowchart (Figure 14) encourages critical thinking about all stages in the product's life cycle. Re-evaluating existing purchasing patterns allows decision makers to begin to make environmentally preferable choices.

Once the preferred products have been selected, the second flowchart (Figure 15) is designed to help reduce the amount of disposable packaging necessary. Organizations can cut down the amount of packaging necessary by requesting it of their vendors or by forming cooperatives with other local purchasers to buy products in bulk.

Figure 14. Upstream Materials Handling – Purchasing

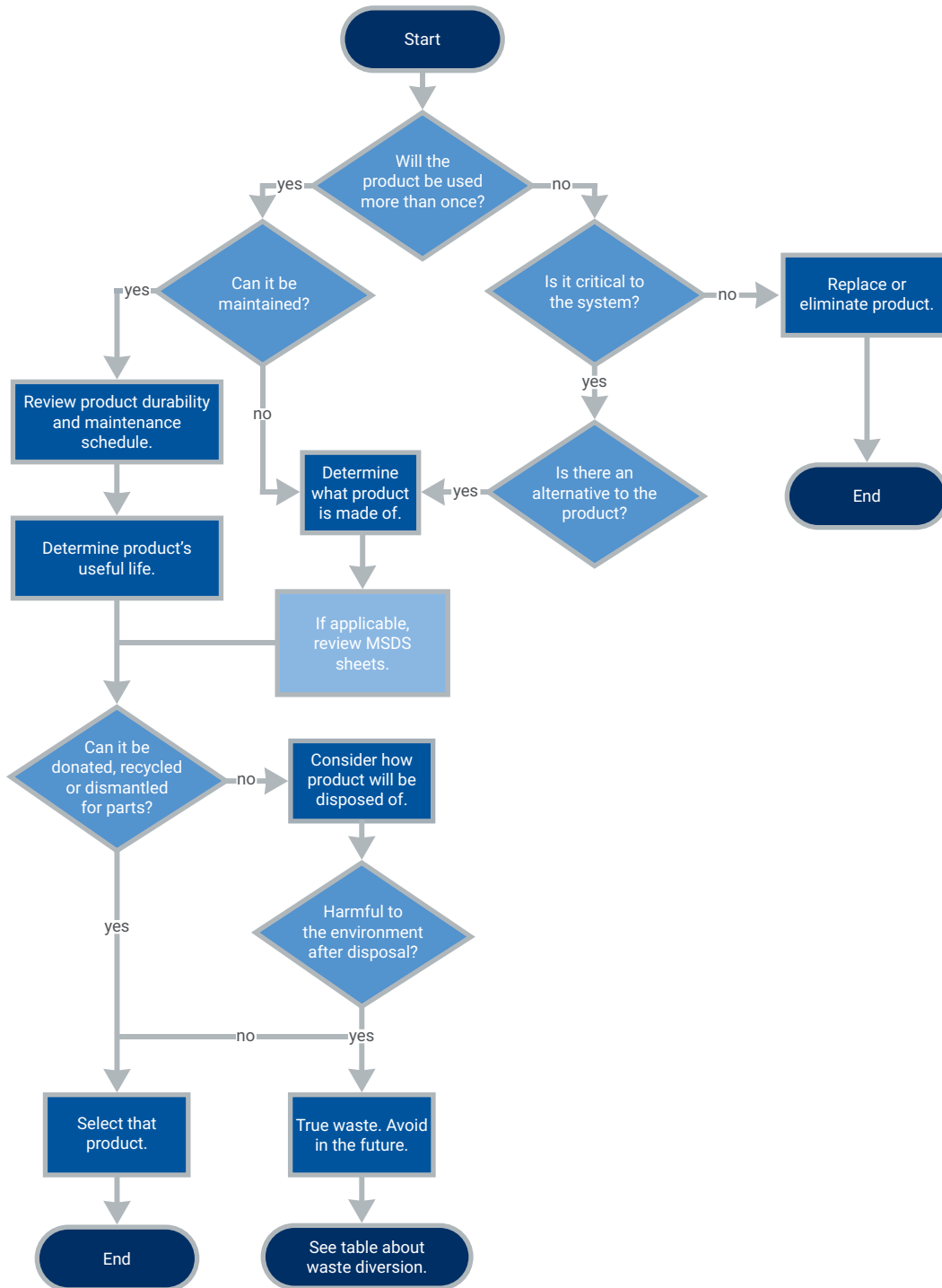
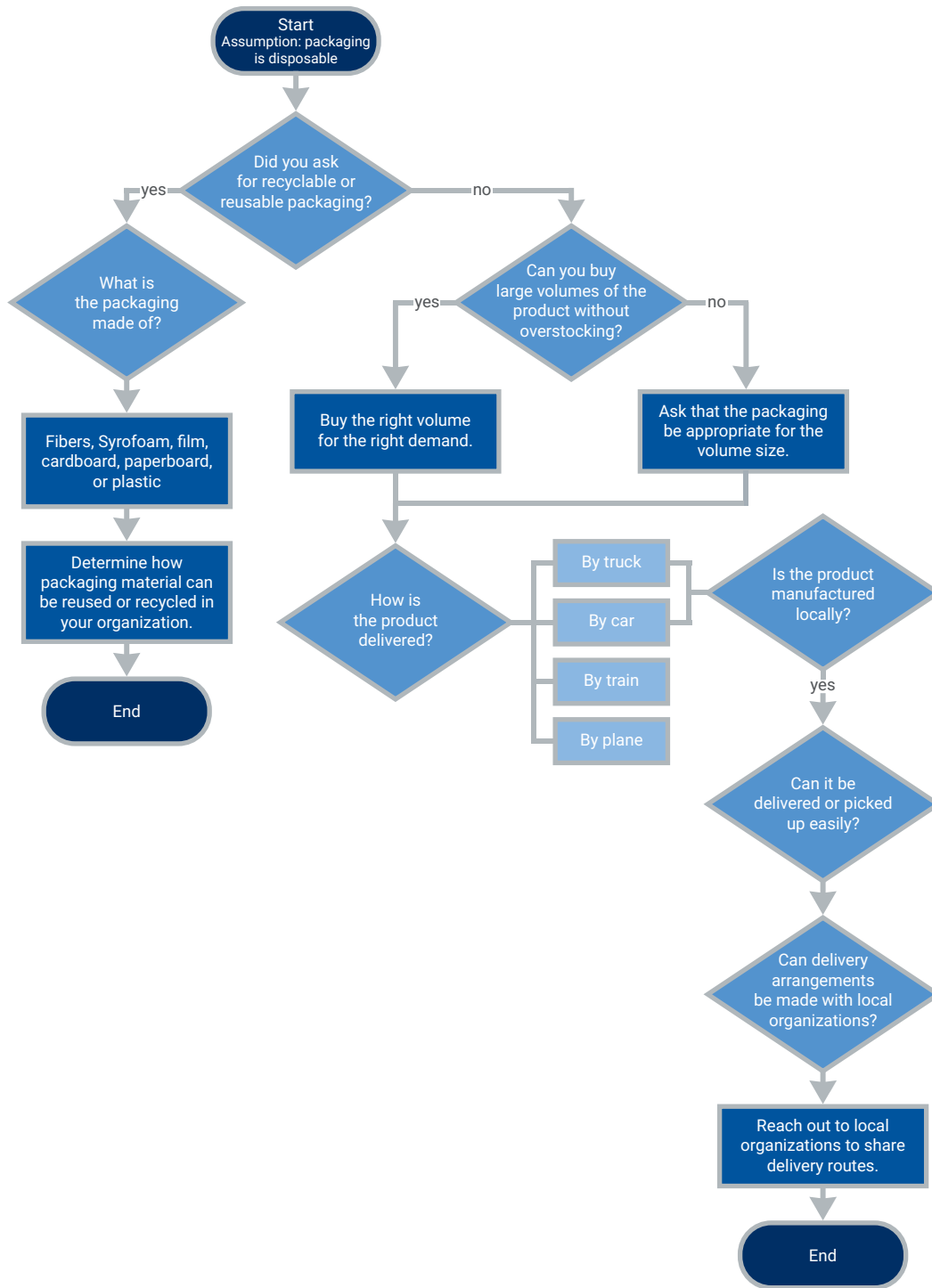


Figure 15. Downstream Materials Handling – Packaging



Material Economy Continuum

Context Scope

The way we think about how we use resources ultimately dictates the way we structure our entire material economy. The economic models of resource use exist on a continuum from least sustainable to most sustainable.

The least sustainable, yet most ubiquitous, approach to materials management is the **linear economy**. In this model, resources are extracted from the environment, formed into products that are used by consumers, and then disposed of back into the environment. This model is also called a “cradle-to-grave” model, because resources have a finite useful life before they are thrown away for good. Though there is room for recycling and efficiency within a linear economic model, the concept itself is unsustainable; the “cradle” aspect of the environment will eventually be overexploited and the “grave” will become overfilled. Depleted environmental resources will affect every aspect of the linear economy as the necessary natural resources become scarcer. Excessive pollution from resource exploitation also threatens human and environmental health. Though the linear economic model has been the dominant way of viewing the economy throughout history, it is not the only way to think about resource use.

The **net-zero-waste economy** is often used as a transition between a linear economy and a circular economy. This model uses the framework laid by the linear economy, but has a strong waste-reduction component. Though significantly reduced, waste does occur within this model when materials managers are unable to access material options that facilitate zero waste. Materials managers can perform a life cycle assessment (LCA) or a total cost of ownership (TCO) assessment to compare the environmental impacts of various products, enabling them to make better purchasing choices. Performance can be measured through regular monitoring and waste audits.

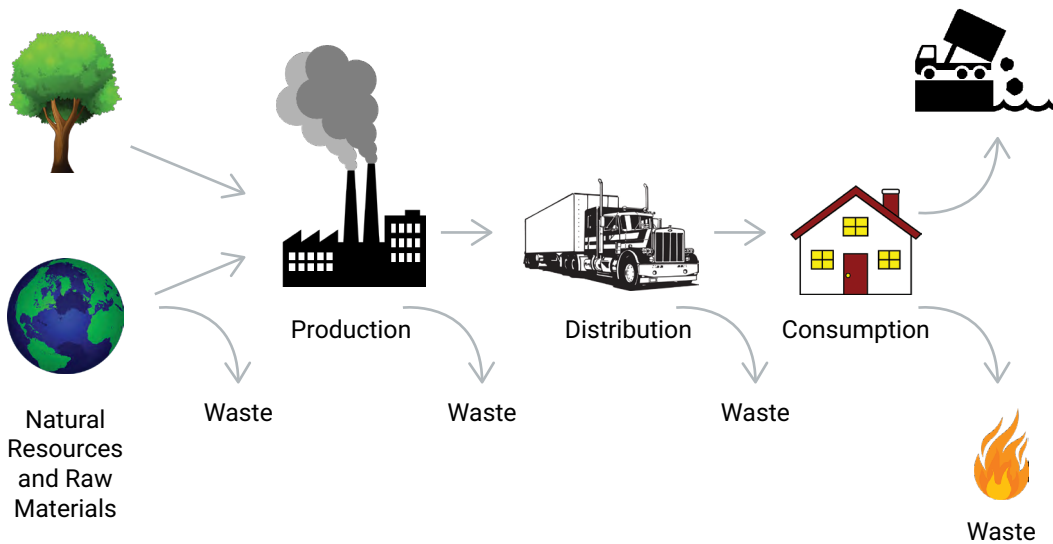
On the most sustainable end of the continuum is the **circular economy** because there is inherently no waste within this model. Materials continue to be valuable after they are done filling a certain purpose; they can be reused and repurposed for new products. This model is also known as a “cradle-to-cradle” model, because of the paradigm shift surrounding waste – materials are “biological and technical nutrients” that circulate within the economy. In order for a circular economy to work, there has to be a fundamental change in the types of materials that are selected. Products and their packaging must be designed with reuse in mind. Sturdy, non-toxic substances that mimic the characteristics of nature are preferred, because they can circulate through the economy many times without degrading or posing any danger to the users.

Over time and through various approaches, managers can transition their material use and purchasing to a more sustainable model. Transitioning from a linear model to a circular one is a process that requires a significant amount of time and effort to understand where materials come from and where they go after use. However, microcosms of cradle-to-cradle economies already exist. Companies such as 3M, Thread, Timberland, Energizer, and Dell have learned how to make valuable products from waste.

Figure 16. Material Economy Continuum

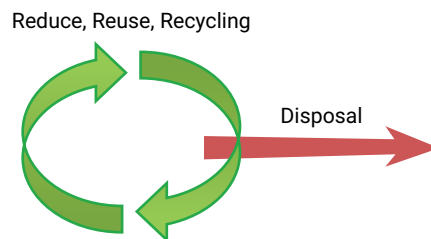
LINEAR MATERIAL ECONOMY (WASTE)

- “Cradle-to-Grave”
- Resources are extracted, processed, distributed, used, and thrown away
- Waste occurs at every step of the process
- Materials are never returned to the system
- Resource exploitation and waste accumulation degrade the environment
- Limits our ability to meet our own material needs in the future
- Recycling and lean production can exist, but are voluntary



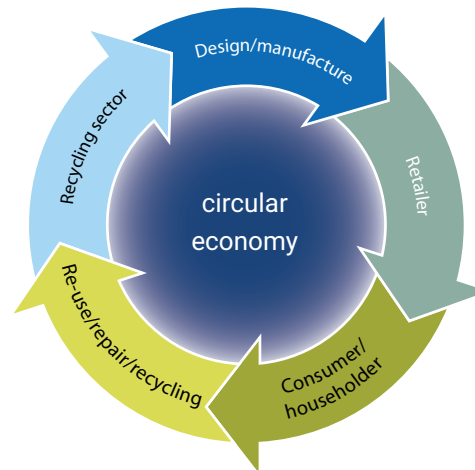
NET-ZERO WASTE ECONOMY (WASTE REDUCTION)

- In between a linear and circular economy, goal is reduced waste volume while transitioning to a zero-waste economy
- Waste does occur due to lack of or underdeveloped/inaccessible options that facilitate zero-waste material throughput
- Requires a waste audit and continuous performance monitoring
- Reflects actualization of LCA and TCO findings, contributing to change in purchasing strategies, change in materials used for products, and change in supplier-consumer relationships



CIRCULAR MATERIAL ECONOMY (WASTE ELIMINATION OR “ZERO WASTE”)

- “Cradle-to-Cradle”
- Waste from one process becomes raw materials for the next
- No pollution, waste, or “grave”
- Recycling and reuse are embedded into the system
- This system requires new, different materials
 - Non-toxic, sturdy, and reusable many times
 - “Biological and technical nutrients” circulating in a healthy metabolism
- Cradle-to-Cradle-certified products already exist on the market
 - Certified by [Cradle to Cradle Products Innovation Institute](#)
 - Include cleaning materials, adhesives, toys, packaging, building materials, office furniture, clothing, and more



Assessment tools reflect complementary perspectives of people and products:

- **Life Cycle Analysis (LCA)** frames material flow through economies (products)
 - Used to quantify and assess environmental impacts of a product across all stages of its life
 - Can be used to compare products to each other to improve purchasing decisions.
 - Four main components of an LCA: Goal and Scope, Inventory, Impact Assessment, and Interpretation
 - › Information can be gathered from vendors during the Inventory phase
- **Total Cost of Ownership (TCO)** frames producer-user accountability that drives material flow (people purchasing products)
 - Financial decision-making approach associated with capital investments
 - Used to qualitatively and quantitatively determine degrees of accountability of material producers and users
 - › Financial accountability tool that addresses environmental, social, and governance (ESG) considerations of products and services
 - Addresses costs associated with stages of a product’s life
 - » Components include:
 - Acquisition costs
 - Liability costs
 - Operations and maintenance costs

- Personnel costs
- Disposition costs

Using both LCA and TCO helps one assess where an organization currently is along the material economy continuum.

Signage Examples

Good signage for your workplace will clearly illustrate what may be recycled, as in the poster below. The challenge is that what is accepted changes frequently; in fact, this poster is out of date at the time of this publication. Work with your waste service provider or Pennsylvania Resources Council to stay on top of what items can be accepted.

Recyclable Items
to separate from your trash:

- METAL**
aluminum and steel cans
- PLASTIC**
numbers 1, 2, 3, 4, 5, 7
- GLASS**
bottles, jugs, and jars
- PAPER**
newspapers, junk mail, magazines, paperboard
- CARDBOARD**
please flatten
- CARTONS**
beverage and soup cartons

What NOT to include:

- NO food waste
- NO plastic utensils
- NO plastic bags
- NO compostable ware (e.g. Greenware®/ Natureworks™)
- NO polystyrene (Styrofoam) foam cups & containers
- NO K-cups
- NO paper food containers
- NO paper towels, tissues or paper that has been in contact with food

FOR ILLUSTRATION PURPOSES ONLY.
Check with your hauler for currently accepted items.

www.prc.org
ZeroWaste PA
PRC Pennsylvania Resources Council
Working to promote the environmental value of PA

Other workplace signs may seek to engage employees in better waste disposal practices, as with the example below.

Recycling Update – 2017

County Office Building



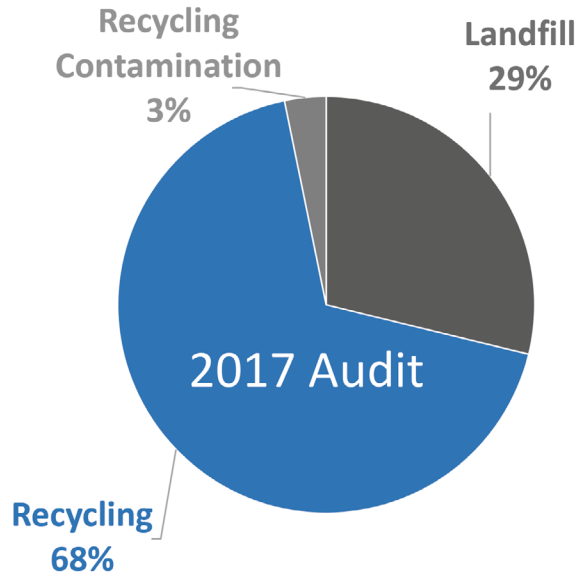
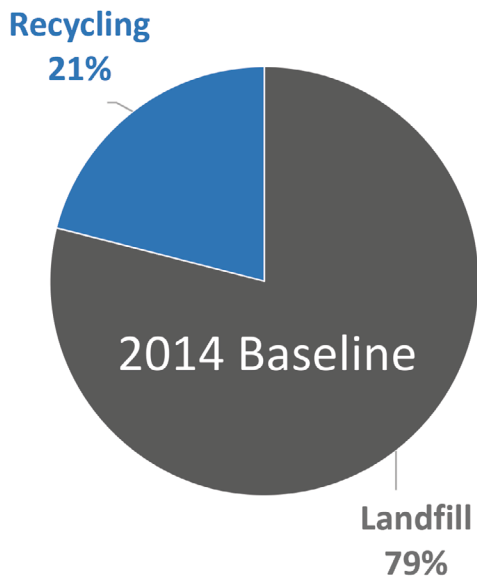
Thank you County Office Building Employees!

In honor of America Recycles Day, November 15th, we are updating all employees on our recycling progress in county facilities.

Our recycling program at the COB continues to be successful due to the efforts of all of our committed employees:

- Diversion Rate Improved from 21% to 68% – 224% Increase
- Overall Waste Quantity Remains the Same

Congratulations and Keep Recycling!



First Reduce, Then Reuse, Then Be Sure to Recycle...

- All Clean Paper and Cardboard Larger than a Postcard
- Plastics #1-5 and #7 Greater than 2" in Diameter
- Steel and Aluminum Cans



CLOSING COMMENT

Much of what is presented in this guide is a moving target. Commercial viability changes; new technologies arise; sometimes there are regulatory or industry-specific drivers. A new industry may be seeking your waste stream as a raw material. Customers and other stakeholders could demand changes in practices. Creative entrepreneurs are developing market and technology solutions every day. If you are driving your organization toward zero waste, don't take "no" for an answer. There may be a startup or strategic/innovative partnership out there that is perfect for your waste/material stream.

The global recycling crisis has intensified, affecting Western Pennsylvania and the nation. The largest material recycling facilities (MRFs) and haulers in our region are revising requirements for business and municipal participation in the single-stream process. As a result of the negative impacts of trash can liners and bags on machinery, local MRFs are no longer accepting trash can liners or trash bags in recycling bins, carts, or totes. As a result of contamination of the glass waste stream in the single-stream process, which makes the glass unmarketable, MRFs may no longer accept glass as part of recycling contracts in the very near future. As a result of a declining market for certain types of plastics, many types of plastics will no longer be accepted for recycling.

The crisis is so acute that contamination-related fines may be imposed upon all entities participating in the local single-stream recycling process. The Materials and Recycling Group workgroup will follow up with updates as the issues are resolved, or with recommended strategies for resolution.

GLOSSARY OF TERMS

Unless otherwise stated, definitions come from ENERGY STAR Portfolio Manager Glossary of Terms.²⁸

Composted – organic waste materials (most commonly food scraps and yard debris) that are decomposed and ultimately, transformed into soil-like fertilizer. Composting may be performed onsite or offsite (where someone picks up your compost and takes it to a commercial composting site).

Disposed waste – waste that was not composted, recycled, or donated. This waste generally goes to a landfill or an incinerator (See Waste Disposal Method, below.)

Disposed Waste Destination – Champions for Sustainability identifies a few ultimate destinations for your disposed waste:

- Landfill
- Incineration (also called waste-to-energy treatment – see below)
- Other/Unknown (when you're unsure of where your trash goes after it's picked up).

Diversion Rate – a measure of the amount of waste diverted from the landfill.²⁹

Donated/Reused – materials that were sold or given to someone who can still use them. For example, a company may replace their computers every few years and donate the old computers to a school.

EPA ENERGY STAR Portfolio Manager – an online tool for use in measuring and tracking energy and water consumption, as well as greenhouse gas emissions. May be used to benchmark the performance of one building or a whole portfolio of buildings.³⁰

EPA Waste Reduction Model (WARM) – Created to help solid waste planners and organizations track and voluntarily report greenhouse gas (GHG) emissions reductions from several different waste management practices. WARM calculates and totals GHG emissions of baseline and alternative waste management practices – source reduction, recycling, anaerobic digestion, combustion, composting and landfilling.³¹

Recycled – materials (most commonly paper, glass, plastic and aluminum) that have been collected and manufactured into new products.

Recycling – Series of activities by which discarded materials are collected, sorted, processed, and converted into raw materials and used in the production of new products. (National Recycling Coalition)

²⁸ "ENERGY STAR Portfolio Manager Glossary." ENERGY STAR Buildings & Plants, U.S. Environmental Protection Agency, N.d. Web. Accessed 5 March 2018.

²⁹ "What's a Diversion Rate?" *CVUSD Recycling Program*, 21 Mar. 2013, Web. Accessed 30 March 2018.

³⁰ "Use Portfolio Manager." ENERGY STAR Buildings & Plants, U.S. Environmental Protection Agency, N.d. Web. Accessed 30 March 2018.

³¹ "Waste Reduction Model (WARM)." EPA, U.S. Environmental Protection Agency, 4 Jan. 2017, Web. Accessed 30 March 2018.

Single-stream recycling (aka “fully commingled” or “single sort”) – A system in which all paper fibers, plastics, metals, and other containers are mixed in a collection truck, instead of being sorted by the depositor into separate commodities and handled separately throughout the collection process. In single-stream, both the collection and processing systems are designed to handle this fully commingled mixture of recyclables, with materials being separated for reuse at a materials recovery facility (MRF).³²

Waste disposal method - one of four options for what you can do with your waste and materials:

- Dispose
- Recycle
- Compost
- Donate/Reuse

Waste to energy – Form of energy recovery where waste materials are treated (mostly burned) to generate energy. Most waste-to-energy processes produce electricity and/or heat directly through combustion, or produce a combustible fuel commodity, such as methane, methanol, ethanol, or synthetic fuels. An example of a waste-to-energy process is an incinerator that produces electricity from the burning of trash. A process that captures landfill gases such as methane to be used as energy is not considered waste to energy.

³² “What Is Single Stream Recycling.” *City of Chicago*. N.d. Web. Accessed 30 March 2018.

ABOUT SUSTAINABLE PITTSBURGH AND CHAMPIONS FOR SUSTAINABILITY

Sustainable Pittsburgh works to affect decision-making in the Pittsburgh region to integrate economic prosperity, social equity, and environmental quality as the enduring accountability, bringing sustainable solutions for businesses and communities. Through its Champions for Sustainability network for businesses, Sustainable Pittsburgh works to accelerate the adoption of best practices, raising the bar, and providing recognition for achievement. Champions for Sustainability regularly convenes the region's Business Sustainability Officers and the CEOs for Sustainability executive council, and operates formal sustainability performance programs including the Sustainable Pittsburgh Challenge and the Southwestern Pennsylvania Sustainable Business Compact On Ramp.

Contributors

This Materials and Waste Management Resource Guide is a project of Sustainable Pittsburgh's Champions for Sustainability network. The guide was produced by the Materials and Recycling Group (MARG), a subgroup of Champions for Sustainability's sustainability professionals, in collaboration with Chatham University.

Through their combined real-world experience, the MARG subgroup's sustainability professionals created this guide for Southwestern Pennsylvania:

- Phyllis Barber, Highmark
- Deborah DeLong, Chatham University
- Benson Gabler, Pittsburgh Living Product Hub – International Living Future Institute (formerly with PNC Financial Services)
- Scott Golla, formerly with Westinghouse/US Steel/BNY Mellon
- Kathy Hrabovsky, Allegheny County
- Kimberly Olivito
- Allison Robinson, UPMC
- Valerie Skinner, MGM Resorts International (former UPMC intern)

Special Thanks

Sustainable Pittsburgh and the MARG subgroup are grateful to several responsible waste management researchers and subject matter experts for their guidance.

Initial Research

Led by Associate Professor of Marketing Deborah DeLong, Ph.D., a Chatham University graduate student team (since graduated) conducted initial research for this Guide. Their professional affiliations at the time of this publication are included below.

- Christen Dinger, Euphebe Healthcare LLC, New York City
- Mollie Pollack, A+ Schools, Pittsburgh

- Sara Rubenstein
- Suzanne Wasilko, Jewish Community Center of Greater Pittsburgh

Expert Review and Advising on the Final Manuscript

- Teresa Bradley, Pennsylvania Resources Council
- Justin Stockdale, Pennsylvania Resources Council
- Kyle Winkler

Champions for Sustainability Funders

- Claude Worthington Benedum Foundation
- Richard King Mellon Foundation
- The Heinz Endowments
- Sustainable Pittsburgh members

FOR MORE INFORMATION



Contact Sustainable Pittsburgh's Champions for Sustainability network:

C4SPgh.org
412.258.6644
info@sustainablepittsburgh.org



For resources related to restaurant waste management, contact Sustainable Pittsburgh's Sustainable Pittsburgh Restaurant program:

SustainablePghRestaurants.org
412.258.6642
dine@sustainablepittsburgh.org

Download this guide at SustainablePittsburgh.org/waste.