

The background of the cover is split diagonally from the top-left to the bottom-right. The upper-left triangle is a dark green color and the lower-right triangle is a teal color. Both triangles are filled with a repeating pattern of white line-art icons related to recycling and waste management. These icons include recycling symbols (three chasing arrows), various types of trash cans, recycling trucks, plastic bottles, paper boxes, and food waste items like a banana peel and a pizza slice.

2025

REFERENCE MANUAL

**S.C. Recycling Professionals
Certification**



SC DEPARTMENT *of*
**ENVIRONMENTAL
SERVICES**

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Abbreviations & Acronyms

- **Act** – Solid Waste Management and Policy Act of 1991 (S.C. Code of Laws §§44-96-10 et seq.)
- **ARF** – Advance Recycling Fee
- **C&D Debris** – Construction and Demolition Debris
- **DWFSC** – Don't Waste Food SC
- **FY** – Fiscal Year
- **LCD** – Land-Clearing Debris
- **MRF** – Material Recovery Facility
- **MSW** – Municipal Solid Waste
- **Office** – SCDES Office of Solid Waste Reduction and Recycling
- **SCDES** – S.C. Department of Environmental Services
- **TSW** – Total Solid Waste
- **U.S. EPA** – U.S. Environmental Protection Agency

About the Office

The SCDES Office of Solid Waste Reduction and Recycling (Office) was established by the S.C. Solid Waste Policy and Management Act of 1991 (S.C. Code of Laws §§ 44-96-10). The Act gives the Office – which is non-regulatory – specific requirements including:

- **Offer guidance and technical assistance** to local governments, K-12 schools, colleges/universities, businesses, and others to develop and improve waste reduction and recycling programs;
- **Set up and implement a solid waste management grant program** for local governments, K-12 schools, colleges/universities, and specific recyclables (see Chapter 4 for more information); and
- **Develop and implement outreach/education programs** to the public and train solid waste professionals.

For a summary of Office programs and material, see Chapter 16 and/or visit des.sc.gov/recycle.

Foreword



FOREWORD

The S.C. Department of Environmental Services (SCDES) **WELCOMES** you to the **2025 S.C. Recycling Professionals Certification Program.**



Reece

It is widely accepted that the safe, smart, and efficient management of solid waste provides significant environmental, human health, and economic benefits. It protects our air, water, and soil from improperly disposed of waste, extends the life of landfills, conserves resources, creates business opportunities and jobs, and more.

It is also one of the key steps in the pursuit of a sustainable future. Recycling coordinators play a critical role in that pursuit. They are the central figure in any recycling – or sustainable material management – program with seemingly endless and various duties focused on the ultimate goal of making the program work.

This certification program is designed to enhance the essential knowledge, practical tools, technical

expertise, management skills, and strategic thinking of recycling coordinators to run more efficient, effective, and sustainable programs.

Inside, you will find:

- **Local Government Responsibilities** – An overview of solid waste management requirements outlined in the S.C. Solid Waste Policy and Management Act (Act);
- **Best Practices** – Clear, step-by-step guidance and proven approaches on how to manage specific commodities (e.g., rechargeable batteries, food waste prevention, solar panels);
- **Recycling Economics** – How to secure contracts with vendors, full-cost accounting requirements, and market strategies;
- **Measurement** – The rules on required data collection and reporting;
- **Practical Examples** – Real-world scenarios and case studies to show how to apply the information in practice;
- **Support Material** – References and resources provided at the end of each chapter, plus appendices with additional information and worksheets; and
- **Beyond the Workshop** – The guidebook becomes a useful reference tool.

Recycling has been a success story in South Carolina. Still, there is much to do. That improvement depends on the collective effort of each of us. By working together, we will reduce our environmental footprint, work towards meeting South Carolina's waste reduction and recycling goals, and contribute to a cleaner, healthier environment for everyone.

Thank you for all you do.

Sincerely,

Myra Reece, Director

S.C. Department of Environmental Services

Acknowledgements

The S.C. Recycling Professionals 2025 Certification and Reference Guide is a publication of the SCDES Office of Solid Waste Reduction and Recycling (Office).

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Recycling in South Carolina



CHAPTER 1

S.C. Solid Waste Policy & Management Act of 1991

The S.C. Solid Waste Policy and Management Act of 1991 (Act), S.C. Code of Laws §§ 44-96-10, establishes the foundation for the safe and efficient management of solid waste with the fundamental goal of protecting human health and the environment.

This comprehensive legislation is a framework of responsibilities, requirements, policies, and goals.

For example, the Act:

- **Prioritizes reuse, waste reduction, and recycling** over disposal or incineration;
- **Places the primary responsibility for solid waste management on county governments;**
- **Defines and requires the measurement** of municipal solid waste (MSW) by counties and permitted solid waste facilities;
- **Places advance recycling fees on four items banned from landfill disposal** – 1) large appliances; 2) lead-acid batteries; 3) waste tires; and 4) motor oil – to fund South Carolina’s overall solid waste management program;
- **Establishes a statewide solid waste program** at the S.C. Department of Environmental Services (SCDES);
- **Sets up a coordinated statewide approach to solid waste management** by requiring SCDES to develop a state plan and each county to develop a plan that is aligned with the state plan;
- **Creates the SCDES Office of Solid Waste Reduction and Recycling** (Office) with specific education, technical assistance, and grant program responsibilities;
- **Requires that SCDES publish an annual solid waste management report** to include the amount and type MSW recycled and the amount of MSW generated and disposed of in South Carolina each fiscal year (FY); and
- **Provides the process** to set statewide waste reduction and recycling goals.

County Responsibilities

The legislation places the primary responsibility for solid waste management on county governments. Below are key takeaways from the Act.

- **Services & Programs** – Counties are required to plan for and provide solid waste management services and programs. For more, see Appendix A;
- **Regional Approach** – Counties are not required but strongly encouraged to pursue a regional approach to solid waste management;
- **Disposal** – Counties must provide or contract for the disposal of MSW in a manner that complies with all federal and state regulations;
- **Recycling** – Each county is required to implement a recycling program and have a recycling coordinator;
- **Waste Tires** – Counties must provide recycling services for waste tires generated by residents in their jurisdiction and to participate in enforcement and cleanup efforts with SCDES;
- **Education & Training** – Counties are encouraged to offer education/outreach initiatives to residents and training to waste professionals to promote proper waste reduction, recycling, and disposal practices;
- **Waste Reduction & Recycling Goals** – Counties and regions are required to meet these goals;
- **Reporting** – Counties are required to report annually to SCDES the amount and type of MSW recycled. In addition, all permitted public or private solid waste facilities must report the amount of MSW disposed of each FY; and
- **Full-Cost Disclosure** – Each county (and municipality) must report the full cost of solid waste management. Appendix F provides a worksheet on how to determine solid waste management costs.

Advance Recycling Fees

The Act (Section 44-96-120) establishes a set of advance recycling fees (ARFs) to fund South Carolina's overall solid waste program and provide financial assistance to local government, college/university, and K-12 school recycling programs.

ARFs are fees paid by the consumer at the point of purchase for specific products or at the wholesale level. In South Carolina, there are ARFs on large appliances, lead-acid batteries, tires, and oil – all products that are banned from landfill disposal.



See Table 1.1 below for additional information.

Grant Funding

ARFs provide the revenue for five grant programs administered by the Office. All applications are typically available annually in the spring. The grant programs are listed below.

1. SOLID WASTE GRANT PROGRAM

This grant program is funded by a \$2 point-of-purchase consumer ARF on appliances and lead-acid batteries.

Cycle	Annual
Eligible Applicants	Counties, cities, towns, and regions that provide solid waste services
Award Amounts	Competitive
Scope	Projects that can demonstrate a positive impact on a local government's efforts to reach their recycling and waste reduction goals

TABLE 1.1: Banned Materials Financing the Solid Waste Trust Fund

MATERIAL	ARF	USE OF FUNDS
Large Appliances	\$2 per item at wholesale level	These fees are used to fund large appliance recycling and SCDES's overall solid waste program (i.e., compliance, enforcement, permitting, education, technical assistance) and for the Solid Waste Management Grant Program.
Lead-Acid Batteries (e.g., car, truck, boat)	\$2 per battery on retail sales, if old battery is exchanged \$7 per battery if old battery is not exchanged	These fees are used to fund lead-acid battery recycling and SCDES's overall solid waste program (i.e., compliance, enforcement, permitting, education, technical assistance) and for local government grants for recycling programs and infrastructure.
Tires	\$2 per tire on retail sales of new or used replacement tires	Of the \$2 fee: \$0.50 is allocated to the Waste Tire Grant Program and SCDES's administration of the state tire program; and \$1.50 goes directly to county governments in quarterly disbursements based upon population for managing waste tires.
Motor Oil	2 cents per quart at wholesale level	This fee is used to fund: - SCDES's administration of used oil recycling and educational programs; - The Used Oil Grant Program for local governments; - The Collegiate Recycling Grant Program; and - The Recycling Education Grant Program.

2. USED MOTOR OIL GRANT PROGRAM

This program is funded by a fee of 2 cents per quart collected at the wholesale level on the sale of motor oil. Grant funding may be used by counties and municipalities for the implementation or expansion of programs associated with the recycling of used motor oil, used motor oil filters, and used oil/gasoline mixtures by do-it-yourself oil changers (DIYers).

Cycle	Annual
Eligible Applicants	Counties, cities, towns, or regions within South Carolina that provide solid waste services
Award Amounts	Competitive
Scope	Establishment, expansion and continued operation of used motor oil collection programs for DIYers. This is to include equipment and programs related to the collection of used motor oil, oil filters, oil bottles, and oil/gasoline mixtures

3. WASTE TIRE GRANT PROGRAM

This program is funded by a \$2 fee per tire at the retail level. Waste tire grants are used for costs associated with the collection or recycling of waste tires.

Cycle	Annual with mid-year applications accepted for stockpile remediation
Eligible Applicants	Counties, cities, towns, or regions within South Carolina that provide solid waste services
Award Amounts	Competitive
Scope	Collection and recycling of waste tires as well as remediation of waste tire dump sites

4. COLLEGE/UNIVERSITY GRANT PROGRAM

Cycle	Annual
Eligible Applicants	All public/private colleges and universities
Award Amounts	Competitive
Scope	Must be used towards meeting South Carolina's waste reduction and recycling goals

5. K-12 SCHOOL RECYCLING EDUCATION GRANT PROGRAM

Cycle	Annual
Eligible Applicants	All public/private K-12 schools
Award Amounts	Competitive
Scope	Must be used towards meeting South Carolina's waste reduction and recycling goals

Other Material Management Regulations & Laws

There is additional legislation beyond the Act that is a significant part of the MSW management in South Carolina.

ELECTRONICS

The S.C. Manufacturer Responsibility and Consumer Convenience Information Technology Equipment Collection and Recovery Act bans specific electronics (e.g., computers, monitors, televisions, printers) from landfill disposal. Residents are responsible for ensuring these devices are recycled and not placed in the trash.

OPEN BURNING

Open burning is the burning of material outdoors releasing smoke and other emissions directly into the air. Examples include burn barrels, bonfires, campfires, and fire pits.

In South Carolina, the legality of open burning depends on who, what, and where. For example, it is against the law for commercial and residential builders to burn anything from construction sites. Additionally, many communities have banned any outdoor burning.

Here is a list of what can be burned if allowed by local ordinance:

- **Leaves;**
- **Limbs;**
- **Pine straw/Pine Cones;** and
- **Lawn and Hedge Trimmings.**

If burning, remember to always:

- **Actively watch the fire;**
- **Have water or other fire extinguishing measures readily available;** and
- **Notify the S.C. Forestry Commission** of any outdoor burning. Call **(803) 896-8800** or visit **scfc.gov/notify/**.

WHAT CANNOT BE BURNED?

- **Cardboard/Paper**
- **Construction and Demolition Debris**
- **Electrical Wire**
- **Household Chemicals**
- **Household Garbage**
- **Metal or Aluminum Cans**
- **Oil**
- **Paint**
- **Plastic**
- **Tires**
- **Rubber Products**
- **Treated or Painted Wood**

These items should be recycled if possible or disposed of properly. To learn more, please visit **des.sc.gov/programs/bureau-air-quality/air-pollution/open-burning**.

ILLEGAL DUMPING AND LITTER

The S.C. Code of Laws Section 16-11-700 prohibits illegal dumping and littering. To view the regulation online, use the link in the "Chapter 1: References & Resources" section.

TRANSPORTATION OF LITTER

According to the S.C. Code of Laws §48-53-20, motor vehicle operators carrying waste in South Carolina must ensure that "litter is secured by means of a covering which is fastened securely so as to prevent any of its load from dropping, sifting, leaking, or otherwise escaping from the vehicle." If not, the vehicle operator could face fines or penalties.

PalmettoPride

The mission of PalmettoPride is to raise awareness of the negative effects of litter on the environment, economic development, and public safety through education, enforcement, and pickup programs.

As the state affiliate of Keep America Beautiful, PalmettoPride coordinates its efforts with state and local governments, civic organizations, and volunteers. Of particular interest to recycling coordinators, the organization partners with the S.C. Litter Control Association to enforce litter, unsecured load, and illegal dumping laws.

PalmettoPride and SCDES have long-standing partnerships including "Action for a cleaner tomorrow" K-12 education curriculum supplement, Recycle Right SC outreach campaign, and the Recycle Here SC recycling app. Both organizations work together on the "See It, Report It" campaign that encourages residents to report illegal tire dumps in their communities quickly and anonymously. Both organizations also coordinate efforts on the cleanup of waste tire dump sites.

To learn more at **palmettopride.org**.



The S.C. Solid Waste Management Annual Report

The Act (Section 44-96-60) requires SCDES to publish a solid waste management report each FY. This comprehensive report focuses on municipal solid waste (MSW) as required and defined in the legislation.

Report requirements include:

- **The amount of MSW disposed of;**
- **The amount of MSW recycled** by commodity;
- **The progress towards meeting South Carolina's waste reduction and recycling goals;** and
- **An estimate of the current capacity** to manage MSW.

MSW includes "everyday" items that are discarded from residential (i.e., single and multi-family homes), commercial (e.g., stores, office buildings, restaurants, hotels, groceries), institutional (e.g., schools, colleges/ universities, government agencies, hospitals, military bases), and industrial sources (i.e., manufacturing).

MSW includes:

- **Containers and packaging** (e.g., aluminum, glass, plastic, cardboard, steel);
- **Durable goods** (e.g., appliances, carpet, rugs, electronics, furniture);
- **Food waste;**
- **Lead-acid batteries;**
- **Non-durable goods** (e.g., clothing, paper, magazines)
- **Used motor oil** from at-home oil changers;
- **Tires;**
- **Wood pallets;** and
- **Yard trimmings.**



The S.C. Solid Waste Management Annual Report for FY24

TABLE 1.3: S.C. MSW Generated, Disposed Of & Recycled by Tons in FY24

MSW Recycled	990,862.93
MSW Disposed Of	3,682,186
MSW Generation (Tons)	4,673,049
MSW Recycling Rate	21.2 percent
Per Capita Recycling	1.0 p/p/d
Per Capita Disposal	3.8 p/p/d
Per Capita Generation	4.8 p/p/d
Population	5,373,544
Local Government Cost Of Solid Waste Management	\$540,899,863

SOURCE: S.C. Solid Waste Management Annual Report for Fiscal Year 2024 (SC SWM Report FY24)

How are MSW disposal and recycling numbers collected?

Data is collected from the following sources:

- **Permitted solid waste facilities** are required by the Act and subsequent regulations to submit annual reports to SCDES the amount of material disposed of;
- **County governments, state agencies, and state-supported colleges/ universities** also are required to report to SCDES the amount and type of material recycled; and
- **Businesses, municipalities, and the recycling industry** are encouraged, but not required, to report their recycling efforts. Because this reporting is voluntary, the data collected from these sources is inconsistent and impacts South Carolina's annual recycling rate.

Where are we?

A SNAPSHOT OF RECYCLING TODAY

In fiscal year (FY) 2024 (July 1, 2023-June 30, 2024), South Carolinians recycled 990,863 tons of MSW. That number equates to recycling 1 pound per person per day (p/p/d) or 365 pounds per person per year and a statewide recycling rate of 21.2 percent. See the graphic below for an FY24 overview.

Figure 1.4 provides an overall breakdown of recycling by category.

Larger populations generate more MSW and potential recyclables. To that point, five counties comprised 55.8 percent of all material reported recycled in FY24. Charleston County accounted for nearly 20 percent.

See Table 1.5 for details.

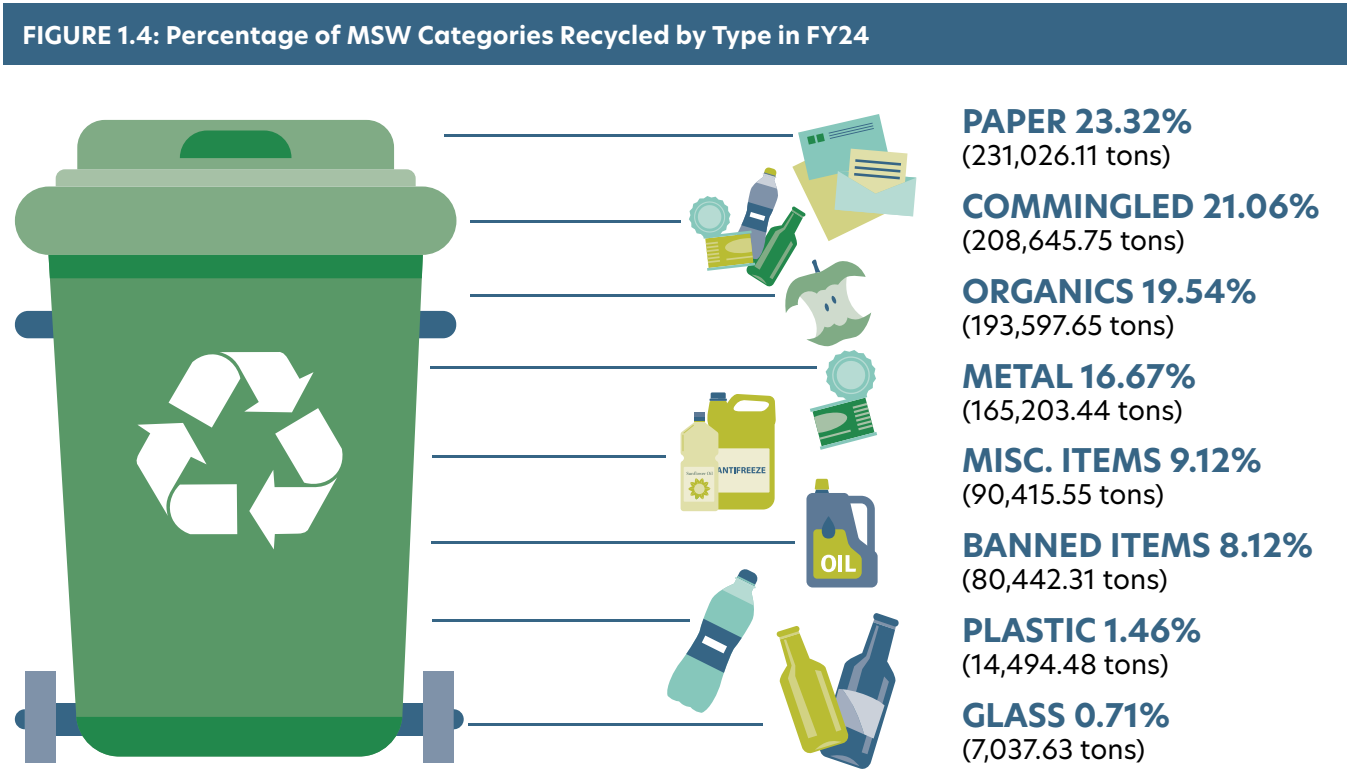
Households play a crucial role in the recycling supply chain nationwide. Residential recycling accounted for 52.3 percent of all the MSW recycled in FY24. See Table 1.6 for a breakdown of local government programs.

Table 1.5: Top Five County MSW Recycling Totals by Tons	
COUNTY	RECYCLED (TONS)
Charleston	191,120.20
Horry	133,538.66
York	90,269.90
Greenville	74,520.30
Lexington	64,302.50
TOTAL	553,751.56

SOURCE: SC SWM Report FY24

TABLE 1.6: Recycling Programs by Type			
METHOD	COUNTIES	MUNICIPALITIES	TOTAL
Curbside Only	0	68	68
Drop-Off Only	20	0	20
Curbside and Drop-Off	26	0	26
Total Recycling Programs	46	68	114

SOURCE: SC SWM Report FY24



CHAPTER 1: References & Resources

- PalmettoPride
- General Information, Report A Litterbug - palmettopride.org
- Illegal Dumping and Litter Regulation - palmettopride.org/enforcement/sc-litter-laws/
- S.C. Code of Laws
 - Title 16, Chapter 11, Section 700, Illegal Dumping - scstatehouse.gov/code/t16c011.php
 - Title 44, Chapter 96, S.C. Solid Waste Policy and Management Act - scstatehouse.gov/code/t44c096.php
 - Title 48 - Environmental Protection and Conservation, Chapter 60, South Carolina Manufacturer Responsibility and Consumer Convenience Information Technology Equipment Collection and Recovery Act - scstatehouse.gov/code/t48c060.php
 - Title 48, Chapter 53, Section 20, Transportation of Litter - scstatehouse.gov/code/t48c053.php
- S.C. Department of Environmental Services - des.sc.gov
 - Composting - des.sc.gov/compost
 - Grant Funding for Local Government - des.sc.gov/community/recycling-waste-reduction/local-government-recycling/grant-funding-local-governments
 - Information on Open Burning - des.sc.gov/programs/bureau-air-quality/air-pollution/open-burning
- S.C. Regulation 61-62.2, Prohibition of Open Burning - des.sc.gov/sites/des/files/Library/Regulations/R.61-62.2.pdf
- S.C. Solid Waste Management Report - des.sc.gov/community/recycling-waste-reduction/solid-waste-and-recycling-reports
- Sustain SC - sustainouthcarolina.org/circularity
- The Sustainability Institute - sustainabilityinstitutesc.org

Notes:

[illegible]

Chapter 2: Recycling Begins with Markets



CHAPTER 2

Material Recovery & Markets

The marketing of recovered material is one of the most critical factors in the success of any recycling program. The cost to bring a material to market and the revenue realized from the sale of that material directly impacts the local government's recycling budget. Given this, available markets for a material and potential market revenue are significant criteria that recycling coordinators should use to target material for recycling.

Generally, a recycling coordinator's goals related to material marketing are to:

- **Direct recovered material into value-added end uses;**
- **Ensure reliable, ongoing markets for collected material** by developing long-term relationships with market players;
- **Maximize and share the revenue received** for marketed material;
- **Understand emerging trends and issues** in the recovered material marketplace and interpret their effect on the program;
- **Evaluate the ability of the marketplace** to absorb additional types and/or quantities of material being considered for recovery; and
- **Increase quality and quantity of recovered material** as possible.

Got markets?

Many different markets and marketing arrangements are available to local governments depending on the community's budget, local resources, and real and perceived barriers

to certain market options. It is beneficial for recycling coordinators to be familiar with the markets available for collected material. In order to identify markets for recovered material, recycling coordinators can:

- **Check with nearby local governments** to see which markets they use;
- **Contact local material recovery facilities (MRF) and waste haulers** to determine the recovered material they accept; and
- **Check the market resources available** from the S.C. Department of Environmental Service's (SCDES) Office of Solid Waste Reduction and Recycling (Office) as well as from the S.C. Department of Commerce's Recycling Market Development Program. See "Chapter 2: Reference and Resources" at the end of this chapter.

Private Haulers

Local governments may contract with a private hauler to collect recyclables and deliver the collected material to a MRF or other processor. It is then processed to meet market specifications and sold to end users that use the material as feedstock in the manufacturing of new products.

While the ownership of the material typically passes to the hauler, it is still in the local government's best interest to ensure that the material is marketed and sold. Some hauling companies also own MRFs while others rely on MRFs owned by a separate company or governmental entity to process the collected recyclables.

DEFINITION

MRF (as used in this manual) refers to a **MATERIAL RECOVERY FACILITY** where mixed recyclables are sorted and prepared for market. Typically, MRFs use a combination of manual and mechanical sorting and then bale material so greater quantities can fit in a truckload. This is a common industry term, but is not a legal definition.

Material Recovery Facilities

South Carolina is home to 10 Material Recovery Facilities (MRFs) – five public and five private – with Pratt Recycling and Sonoco Recycling operating all the privately owned facilities. See Map 2.1 for more details.

PRIVATE MRFS

These facilities specialize in providing processing services to local governments under contract and also may offer collection services. In addition, some companies – including both Pratt and Sonoco – have divisions that further process material and manufacture packaging products.

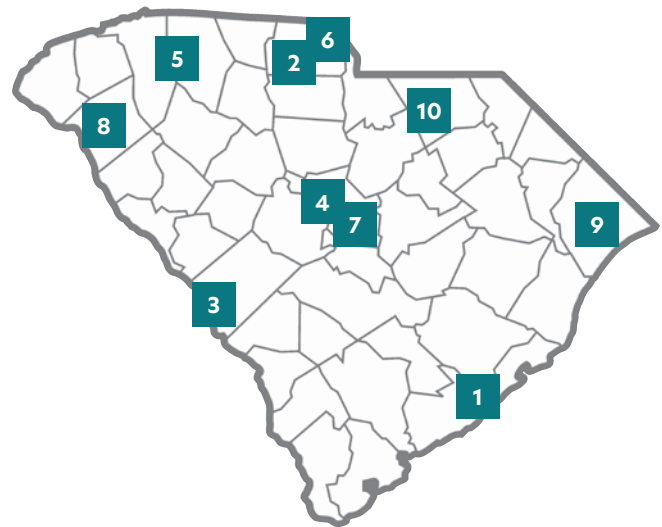
In some cases, a private processor will establish a MRF by contracting with one or more local governments to accept recyclables that are under their control, whether collected by local government crews or private haulers. Having a commitment for a certain amount of material helps the company secure funding to construct the MRF. The capital to develop the MRF can be provided by a private operator or a local government(s).

A processing fee may be charged to cover some costs of operating the MRF and/or the processor may cover costs, in part or in whole, with revenue from the sale of recyclables. MRFs are more likely to charge processing fees when market prices are low, when recyclables are commingled, and when revenue from the sale of recyclables is shared with local government suppliers.

PUBLICLY OWNED MRFS

Some local governments or groups of local governments (regions) own MRFs. Some facilities

MAP 2.1.: S.C. MRF Locations



1	Charleston County	8099 Palmetto Commerce Pkwy., North Charleston 29456
2	York County	1500 McFarland Rd., York 29745
3	City of North Augusta	61 Claypit Rd., North Augusta 29841
4	Pratt	120 Atlas Rd., Columbia 29209
5	Pratt	225 Morley Ct., Duncan 29334
6	Pratt	72 Celriver Rd., Rock Hill 29730
7	Sonoco	1132 Idlewilde Blvd., Columbia 29201
8	Anderson County	203 Landfill Rd., Belton 29627
9	Horry County	511 Three R Dr., Conway 29526
10	Sonoco	1037 Hilton Ave., Hartsville 29550

SONOCO Recycling

SONOCO Recycling, a division of SONOCO, provides recycling services from hauling to sorting to wholesale distribution of material such as paper, plastic, and metal. SONOCO Recycling runs privately owned MRFs in Columbia and Hartsville. Many local governments in the surrounding areas send recyclables to SONOCO.

Visit sonocorecycling.com for more information.

SONOCO
RECYCLING
INC.

Pratt Recycling

Pratt Recycling, a division of Pratt Industries, works with communities and businesses across the United States to help divert material from landfills. It has 16 modern recycling facilities and an operational footprint from New York to California.

In South Carolina, Pratt Recycling has three facilities primarily in the Upstate. Many local governments in the area send recyclables to these facilities.

Visit recycle.prattindustries.com for more information.



are operated by the local government or region (sometimes as an authority) while others have contracted operators that have experience operating such facilities and marketing material. Larger regional MRFs may have access to an expanded array of end markets both regionally and globally. This may result in the ability to collect a broader range of recyclables in more stable markets. See Table 2.1 for a list of MRFs in South Carolina.

Private Dealers

Private material dealers are the original backbone of the recycling industry. These companies specialize in one or more types of recovered material, usually paper or metal, and may agree to accept and process other material in return for receiving all of the targeted material generated by the local government. A benefit of using a dealer is that they usually have significant market experience with their specific material.

Brokers

Brokers arrange for the marketing of material to the end market or intermediary processor on behalf of either the local government or the processor, but do not own facilities or take actual possession of the material. Brokers usually charge a fee for their services in the form of a percentage of the total value of the sale. Brokers usually work for and guarantee the end user a certain tonnage. The broker then works with many sources of the material in order to supply the tonnage it has guaranteed to clients.

Brokers are commonly used in the paper industry and have a long history of supplying recovered paper to mills. Large paper mills have hundreds of sources supplying them with material and by using brokers the mill can reduce the number of entities with which they need to maintain relationships. Brokers also are active suppliers to recycled plastic markets.

End Users

End users are entities that use recovered material as a feedstock in manufacturing new products and packaging – or to further process materials to make them suitable feedstock for a manufacturer. They purchase material processed to their own specifications.

The end user may be under contract directly with the generator (such as a local government), with the processor, or with a dealer or broker.

Most end users deal only in truckload quantities of at least 35,000 pounds. That means smaller generators (such as smaller municipalities) are unlikely to deal with end users directly unless they have a consistently high-quality material. In some cases, arrangements may be made to combine loads with other processors in the area or to accept smaller quantities (sometimes in return for a lower price, but not always). Manufacturers increasingly rely upon recovered feedstock to:

1. **Help achieve their own corporate sustainability goals;**
2. **Manufacture recycled-content products** that help customers achieve their sustainability goals;
3. **Reduce the cost of feedstock** as the use of recycled feedstock may reduce harvesting/sourcing and transportation costs; and
4. **Expand options for feedstock suppliers.**

To the extent that feedstock can be used locally, overall transportation costs are reduced and the activity stimulates the local economy. As is described previously, some end users are vertically integrated and therefore may have divisions that collect and/or further process material and manufacture end products.

LOCAL SPECIALTY ENTREPRENEURS

Local specialty entrepreneurs are small-scale end users that provide an alternative use for material (e.g., a company that makes building insulation from old newspapers or decorative tiles from recovered glass). Some of the advantages of using specialty markets are that they may:

1. **Accept small quantities;**
2. **Be local and therefore less costly to ship to;** and
3. **Provide local employment opportunities.**

Potential drawbacks of specialty entrepreneurs include financial instability and the inability to accept large or consistent quantities of material.

OVERSEAS MARKETS

Overseas markets play an important role in the worldwide recovered material economy, but doing business directly with an overseas market can pose challenges. It is hard to check references on overseas companies to verify if you are in fact negotiating with an end user as opposed to a broker.

In addition to a possible language barrier and paperwork required to export material, another disadvantage is that this material is taken out of the supply chain for domestic businesses that may need the material.

The advantage to using export markets is that, in many cases, they:

1. **Pay the highest prices;**
2. **May accept plastic resins that do not have stable domestic markets;** or
3. **Take lower-quality material because they have laborers to sort.** In recent years, more and more foreign markets have implemented restrictions on foreign material that does not meet quality standards.

In terms of sustainability, however, foreign end markets may not be the best choice as some countries lack environmental controls or worker protection at their facilities. Also, these markets can be fickle and demand can diminish as quickly as it appeared. The strengths and weaknesses of the market options discussed previously are summarized in Table 2.1.

State Contracts

For some recovered material, the state has negotiated contracts with specific markets. These contracts must be used by state agencies and public colleges/universities. Local governments, public schools, and school districts that have adopted the state's procurement code in its entirety also must use these contracts, while

Considerations for Assessing Markets



TABLE 2.1: Summary of Recovered Material Market Options		
MARKET OPTIONS	STRENGTHS	DRAWBACKS
Private Hauler	May integrate collection, processing, and marketing which can simplify contract administration	Attention must be paid to contractor selection and contract development to protect local government's best interest
Private MRF	- Companies specialize in processing and marketing material so they focus on the activities and have developed expertise - These companies have developed strong market networks	- Smaller communities may have difficulty attracting a private MRF due to small volumes and lack of economies of scale - Processing fees may be an unacceptable up-front cost for some local governments
Public MRF (owned by another local government)	- Cooperative arrangements with other local governments to combine volumes may benefit all parties by boosting revenue - Can save local governments money rather than building their own facility and avoids capacity duplication	- Political considerations may limit this option - Record-keeping and reporting arrangements must be made to give each contributor proper credit - If the facility is operated by public staff, they may not have the expertise and market leverage that large processing companies have
Private Dealer	- Have broad expertise in handling and marketing one or two materials - Usually have been a long-time presence in the community	May not have processing and marketing expertise for the full range of recyclables collected by local government programs
Broker	- Have established relationships with a large number of end-users - Assume responsibility for market arrangements and logistics, often an important time saver for busy recycling coordinators	May be just as easy to work directly with end-users for some commodities
End User	- Cutting out the middle man may result in higher revenues - Provides assurance that recovered material is recycled into specific products	- Volumes required for shipping may be too large for smaller programs - Specifications tend to be more stringent
Local Specialty Entrepreneur		
	- May accept small quantities without costly processing - Marketing locally saves transportation costs and boosts local economy - May add value to otherwise low-value material such as glass	- Demand for material may be inconsistent - Products produced must have markets to ensure financial stability
Overseas Market		
	- Often pay higher prices than domestic markets - May accept lower-quality material or material not acceptable to domestic buyers	- Language and paperwork barriers may be daunting - There is no way to verify if material is actually recycled - Some countries do not have adequate health, safety, and environmental regulations
State Contracts	- Are already identified and their prices are set - Since the state has awarded the contracts, local governments can be reasonably assured that they are reliable - Is less time consuming for the recycling coordinator	May prevent a potential local market from providing the service

TABLE 2.2: Checklist to Evaluate Market Options

MARKET OPTIONS	QUESTIONS TO ASK
Private Hauler	☐ Can they offer integrated services for collection, processing, and marketing? ☐ Are they a national company with strong market networks? ☐ If they are not able to offer the above, where will they take the material for processing and marketing?
Private MRF	☐ Which end-use markets do they use for each material? Some processors will be reluctant to provide this information due to concerns about competition. It is, however, important to ensure that value-added markets are used and that any local specialty entrepreneurs are reliable for the long term. ☐ Are they willing to enter into a processing agreement that includes separate end-use market agreements that they would execute, control, and assume the risk? ☐ Can you tour the facility? Well-managed facilities will exhibit quality in the processed material waiting to be shipped, good housekeeping in the facility, safety and risk protection for workers, and a residuals stream that does not contain excess recyclables. ☐ Can the processor supply references?
Public MRF (owned by another local government)	☐ Which end-use markets do they use for each material? ☐ What is the capacity of the facility and the potential for long-term use (i.e., when may their own program grow enough to need the capacity for itself)? ☐ Is the processor willing to negotiate an agreement that would include a processing fee, a revenue share, and regular material tonnage reports?
Private Dealer	☐ Which material do they specialize in processing? ☐ Do they have experience in processing and marketing other material? ☐ Which end-use markets do they use for each material? ☐ Is the processor willing to negotiate an agreement that would include a processing fee, revenue sharing, and regular material tonnage reports?
Broker	☐ Which material do they specialize in handling? ☐ Which end-use markets do they use for each material? ☐ Can they combine your loads with other smaller program loads to move to higher-value end users?
Local Specialty Entrepreneur	☐ Which material can they accept? ☐ What are the markets for their products and how stable are they? ☐ What is their long-term business plan? ☐ Can they guarantee a market for a certain tonnage and a certain time period?
Overseas Market	☐ Will they pay higher prices than domestic markets? ☐ Will they accept material that is difficult to market to domestic buyers? ☐ What country is the material going to and what is its end market? ☐ Will they enter into a medium- or long-term contract? ☐ Can they provide assistance with paperwork and documentation? ☐ What is known about employee work conditions and the environmental impacts of their operations?
End User	☐ What is the product that they manufacture? ☐ What is their minimum quantity? ☐ What are their specifications? ☐ What are the procedures for off-spec or rejected loads? ☐ Can they assist with shipping costs? ☐ Can they provide you with references for verifying payment?
State Contracts	☐ Which material is accepted under contract? ☐ Are there minimum quantities? ☐ How is payment received or billing carried out? ☐ What are the paperwork and documentation requirements?

others may choose to use them. The State Fiscal Accountability Authority administers all state contracts. Information technology contracts are administered by the Information Technology Management Office. Contracts for goods and services are administered by the Materials Management Office.

Assessing Market Potential

In order to assess the options and negotiate the best marketing arrangement for a specific community, the recycling coordinator should first engage in an examination of the recycling program's goals and resources in terms of the available potential markets.

Strategies for Effectively Marketing Material

Marketing recovered material is a task that is different than most functions of local governments because the local government is the seller instead of the purchaser.

Local governments often face the questions listed below.

- **Is it more important to have:** 1) a dependable outlet for material collected; or 2) to maximize the revenue received from the sale?
- **How much time is there to spend looking for the best markets?**
- **How much storage is available while waiting for a market that offers the best price?**
- **Can the quality and quantity standards be met for most potential markets?** If not, are there actions to take (e.g., investing in additional processing equipment, combining loads with other generators)?

The answers to these questions will vary for each local government, but the following are strategies used to market material.

- **Secure Movement** - If a program is most concerned with always having a market - even when prices decline for recycled material - the tendency is to accept a low price (or no price) for always being able to move material to market.

Secure movement is a particularly tempting strategy when:

- A processing facility is somewhat undersized or lacks ample storage space;
- A buyer is found that will accept smaller quantities or lower-quality material than other potential markets;
- A facility has a strong relationship with a particular end market; or
- The market for the commodity has been weak, in general.

If a processor is accepting a low price or no price for a commodity, it can be tempting to lower processing standards as the material is moving anyway. This can backfire in the long term if material becomes so contaminated there is no outlet that will accept it.

- **Price** - While obtaining a high price is considered a good outcome for sellers of commodities, always "chasing the highest price" may not be best strategy. Selling material at a higher price can work well when there is a shortage of recovered material. Waiting for the highest price can be problematic, however, when it prohibits establishing long-term relationships with end markets. When there is an oversupply of material, those sellers with established long-term relationships will tend to have success in selling their commodity.

Prices paid for recovered material always vary over time, in many cases due to factors out of the control of the recycling coordinator. Fuel cost increases, changes in the national economy, and even the weather can disrupt material pricing. Prices also may vary due to circumstances that the recycling professional can control (e.g., contamination, reduced tonnage).

- **Revenue & Value** - The marketplace is designed to reward value with revenue as long as the recycling coordinator knows how to balance secure movement and price. Historically, most recycling programs share the revenue from their recyclables with the processor and pay the processor a processing fee that covers the fixed costs of the facility operation. Recycling coordinators dealing with private processors under contract -

either haulers or MRFs – often operate under the assumption that they are giving the processor an advantage by allowing them to keep all of the revenue.

In addition, some private recycling service providers try to structure the processing contract such that the processor keeps all revenue. Most private service providers with experience in the field of recycling encourage local governments to keep most of the revenue because it means that they also incur the market risks.

Sharing revenue provides an incentive for the processor to use the highest paying markets and allows the local government to receive a share of the revenue based on a fixed formula. The needs for a fair price and secure

movement are both met. Processing fees and revenue sharing arrangements are discussed in more detail in Chapters 11 and 12.

- **Long-Term Contracts vs. Spot Markets** – Generally, smaller programs are more vulnerable in using spot markets, but their smaller volume of material may make long-term contracts unfeasible. Recycling coordinators who are managing smaller programs can benefit from using a few markets on a consistent basis, if possible, rather than relying on just one or choosing a new market every month. Larger programs with consistently high tonnages will benefit more from long-term contracts, but those with larger volumes also can sell some material in the spot market.

Market Resources

SCDES and the S.C. Department of Commerce provide essential programs to help local governments, businesses, and other organizations find markets for recycled material and market value for recycled commodities.

- **S.C. Recycling Markets Directory** is free, interactive online directory that offers a listing of more than 300 companies, organizations, and others that provide services and markets. Please visit recyclinginsc.com/directory/ for more information.
- **The S.C. Material Exchange** is a free interactive online service designed to find markets for material traditionally discarded. Registered users can post both wanted and available listings, similar to a classified ad section. Visit scmaterialexchange.org/ for more information.
- **Commodity Pricing** is a free service by the Office that provides current commodity prices centered in the Southeast. The market update is sent via email biweekly to recycling coordinators and others. To be added to the list send an email to recyclelocal@des.sc.gov.



This enables the recycling coordinator to:

- Monitor trends in the marketplace; and
- Develop additional market relationships.

It is important to maintain transparency to prevent conflicts and preserve relationships among all concerned parties.

- **Cooperative Marketing** - This can be particularly beneficial for communities that generate relatively small quantities of material, as buyers typically prefer to purchase full truckloads and sellers receive more favorable pricing for full truckloads.

Cooperative marketing can be as simple as staying in touch by phone with a nearby local government and sharing a market pick-up with them. On the other hand, it can be as complex as a membership organization that assists smaller local governments with all aspects of marketing - from quality control to negotiating prices.

ReMA Recovered Materials Specifications

The Recycled Materials Association (ReMA, formerly the Institute of Scrap Recycling Industries, ISRI) is a nationally recognized organization that develops, updates, and publishes specifications for recovered material. The specifications are internationally accepted and are used in worldwide trading.

These specifications are intended to assist members in the buying and selling of their material and products including paper, plastics, ferrous and non-ferrous metals, tires, glass, and electronics.

Specifications are reviewed on an ongoing basis to ensure they meet the demands of the global marketplace. Any individual, company, or organization can propose additions, modifications, or deletions to the specifications.

Below are examples of ReMA material specifications.

Mixed Paper: Item Code 54

- Consists of all paper and paperboard of various qualities not limited to the type of fiber content, sorted, and processed at a recycling facility
- Prohibitive material may not exceed 2 percent
- Outthrows (non-recyclable material) may not exceed 3 percent

Sorted Clean News: Item Code 58

- Consists of sorted newspapers from source separated collection programs, converters, drop-off centers, and paper drives containing the normal percentages of rotogravure, colored, and coated sections. May contain inserts that would normally be included in the newspaper in the proper proportions. Grade must be free of excessive ink, brown grades, and non-paper material. (Some mills may require pack to be free of flexographic inks.)
- Prohibitive material may not exceed 1/2 of 1 percent
- Outthrows and prohibitive material may not exceed 1 percent
- Other papers may not exceed 10 percent

Visit recycledmaterials.org for information about ReMA, and remaspecs.org for specifications.



Recycled Materials
Association
Sustainable. Resilient. Essential.

CHAPTER 2: References & Resources

- Association of Postconsumer Plastic Recyclers (APR) - plasticsrecycling.org
- Recycled Materials Association (ReMA) - recycledmaterials.org
- Recycled Materials Association (ReMA), Specifications - remaspecs.org
- National Association for PET Container Resources (NAPCOR) - napcor.com
- S.C. Budget and Control Board, Procurement Services - procurement.sc.gov
- Recyclingmarkets.net Commodity Pricing Service - recyclingmarkets.net
- U.S. Environmental Protection Agency, Recycling Economic Information (REI) Report - epa.gov/smm/recycling-economic-information-rei-report
- Recycling Market Resources
 - The Aluminum Association - aluminum.org
 - APR, Buyers and Sellers - plasticmarkets.org
 - Carton Council - recyclecartons.com
 - Glass Packaging Institute, Cullet Processor - gpi.org
 - S.C. Recycling Markets Directory - recyclinginsc.com/directory/
 - Southern Waste Information Exchange (SWIX) - southernwasteinformationexchange.com
 - Steel Recycling Institute, Steel Recyclers - steelsustainability.org

Notes:

[illegible]

Residential Recycling Programs



CHAPTER 3

Choosing and Managing a Residential Recycling System

Selecting, implementing, and managing a recycling system or combination of systems for a community recycling program is not a simple task. A recycling coordinator's familiarity with the following factors is important in the decision-making process:

- **The specific community** and its goals and priorities;
- **Population and demographics**;
- **Potential cost** and available resources;
- **The county's solid waste management plan**; and
- **Potential service providers available.**

Managing a program involves monitoring performance and then adjusting the system to enhance the program according to specified

goals and outcomes. This is a continuous improvement process – starting with a plan and then changing policies and operations if necessary to optimize program performance and recover the maximum amount of quality material.

Recycling programs can vary significantly depending upon each community's needs and resources, recycling facilities' abilities, and types of collection vehicles used. Some major factors to consider include:

- **Material to include in the program**;
- **Whether collection will be curbside, drop-off, or both**; and
- **Whether the program will be operated with public staff or via a contract by a private entity or entities.**

Targeting Material

To start a recycling program or to expand existing programs, it is critical to pick the right targets for recycling. Targets can be material and/or generators and differ in each community.

Recycling coordinators should ask themselves the following questions when determining targets for increased diversion.

- **QUESTION:** What recyclable material is still being disposed of in large quantities (or is problematic to manage)?
- **ANSWER:** To determine the quantity and types of recyclable material that is still being disposed of within a given community, recycling coordinators can conduct waste characterization studies at local disposal facilities. Sampling, however, can be costly and logistically complicated especially when the landfill is not owned by the local government. Even in communities with strong recycling programs, large quantities of recyclable material are still sent to a landfill. A visual inspection is another way to identify material types that are not being recycled. Consider observing several times per year as material streams can fluctuate by season.



Reasons recyclables may be disposed of include:

1. **New types of packaging are continuously being introduced into the marketplace**, which can confuse residents;
2. **Residents may not have a clear understanding** of what should and should not be recycled;
3. **Residents may be unaware of the opportunities they have to participate in convenient recycling programs**; and
4. **Residents may fear recycling** will be time consuming or do not realize the benefits.

Education and outreach (see Chapter 16) can help increase diversion of material that is already included in the recycling program. Recycling coordinators may identify material that can be added to the program based on:

1. **Quantities generated**;
2. **The ability of recyclers to accept and market the material**; and
3. **The best means of collecting the material**.

- **QUESTION:** How can a recycling coordinator identify and address issues that may arise due to new types of packaging?
- **ANSWER:** Residents can be surveyed to find out what confuses them about recycling. Once confusing or problematic packaging types have been identified, discuss the issue with the Material Recovery Facility (MRF) manager to see if they can accept the material. The MRF manager may be able to identify additional material that the facility can accept, so it is important to ask this question on a regular basis. From there, update your outreach material.
- **QUESTION:** What markets exist for this material?
- **ANSWER:** There is no reason to divert material from disposal in the absence of viable markets. Recycling coordinators can talk to their peers and to local MRF operators to find out what material may have markets. Some material – such as scrap metal – can be discussed with private dealers or brokers.

Some packaging types, however, like foil-coated wrappers simply do not have a widespread end use aside from waste-to-energy. Other material – such as plastic bags – have markets, but require specific collection and processing separate from traditional recyclables.

- **QUESTION:** Who are the primary generators of the targeted material? Is there a specific “gap” in collection infrastructure or an under-performing geographic area that can be identified?
- **ANSWER:** When assessing the current program, consider examining different neighborhoods and/or drop-off locations to gain an understanding of gaps in infrastructure. The gaps could be improved by:
 1. **Expanding service**;
 2. **Relocating or enhancing** a drop-off site; or
 3. **Increasing education and outreach efforts**.

Conducting residential surveys or speaking at neighborhood meetings are other ways to obtain some of this information.



Monitoring Results of Residential Recycling Programs

To maximize the effectiveness of residential programs and identify opportunities for improvement, recycling coordinators can track data such as:

- **Participation rates;**
- **Recycling rates;** and
- **Contamination rates.**

Additionally, information about program effectiveness can be obtained by:

- **Reviewing data** (e.g., collection/hauler data, demographic data);
- **Conducting surveys;** and
- **Performing waste characterization studies or visual audits** of disposed waste and recyclables.

More about measuring, monitoring, and reporting can be found in Chapter 13. Information about policies that support recycling programs can be found in Chapter 15.

Processing & Markets

The recycling coordinator should work in partnership with all potential processors and markets to ensure that material is collected in a way that processors can manage. Collection infrastructure decisions will be determined, in part, by available processing capabilities and

market requirements. See Chapter 2 for more on the importance of markets.

Deciding Upon a Collection Method

The primary factor that impacts the feasibility of curbside collection is cost. Factors that make residential curbside collection more cost-effective include:

- **Higher housing density;**
- **High level of participation;**
- **More automated collection;**
- **Less frequent collection;**
- **High-quality recyclables;** and
- **High disposal tip fees.**

In some communities, residents hire their own recycling service provider and choose to pay to recycle because it either saves them on disposal fees (where pay-as-you-throw exists) and/or they feel it is the right thing to do (particularly if drop-off recycling is not available or convenient for them).

For a rural community with low population density, curbside recycling may be cost-prohibitive, discouraging even private haulers from offering the service. Drop-off sites that are conveniently located, have knowledgeable and helpful attendants, and offer solid waste collection may increase participation in the recycling program.



TABLE 3.1: Strengths & Weaknesses of Curbside Recycling Service Provider Options

SERVICE PROVIDER	STRENGTHS	WEAKNESSES	COMMUNITY EXAMPLES
Local Government	- Has control over program and can make changes as desired. - Local governments often feel they maintain higher levels of customer service. - May be able to use vehicles for multiple functions. - One service provider – less traffic impact than open system or non-exclusive. - Has mechanisms to collect from customers that do not pay (e.g., tax liens), avoiding risk of non-payment.	- Has fiscal responsibility for vehicle upkeep and repair. - Personnel resources required for billing, customer service, collection, management. - Unexpected costs can arise, making budgeting more challenging. - If local government is small, vehicles may not be fully utilized, making service less cost effective. - Residents do not have option to select service provider.	- Columbia - Greenville (City) - Myrtle Beach - North Myrtle Beach - Spartanburg (City)
Contracted Hauler or Exclusive Franchise Each hauler serves entire county/town/city or geographic portion of county/town/city	- One service provider – less traffic impact than open system or non-exclusive. - Relatively few municipal resources required. - Economies of scale, efficiencies may result in lower rates than other options. - Agreement with community allows community some control. - Community may earn franchise fees. - Costs are generally known, do not fluctuate wildly, simplifying budgeting. - Usually municipality pays service provider using tax revenue resulting in low risk of non-payment.	- Competition can be reduced over time, if few service providers in region. - Monitoring of service, contract provisions required. - Municipality has some control through contract agreement, but less able to make changes throughout the contract term than if municipality directly provides the service. - Residents do not have option to select service provider.	Richland County
Non-Exclusive Franchise Multiple haulers are authorized by local government to provide service in designated area(s)	- Franchise agreement provides the local government with some control. - Relatively few municipal resources may be required. - Franchise fees may be paid to local government. - Residents have some choice among haulers. - May allow for more small haulers to remain viable, maintaining competition over time.	- Increased traffic impacts relative to single-service provider options. - Local government may need to monitor performance, review franchise agreements and do billing. - Municipal burden may increase due to managing multiple agreements. - Service levels may not be consistent among service providers – may make education efforts challenging. - Usually customers pay hauler directly – non-payment risk shared among all customers.	
Subscription System	- Minimal municipal resources required. - May help smaller haulers stay in business, maintaining competition in the long run. - In some cases haulers must obtain a permit or license, which can provide the local government with some control. - Resident are free to choose their own service provider.	- Service levels may not be consistent among service providers – may make education efforts challenging. - Local government may have little control over program. - Non-payment risk shared among all customers. - Traffic impacts likely to be highest under this option.	Lexington County

Curbside Collection

Curbside recycling services often are provided by the same hauler that provides trash collection. Curbside recycling also could be provided by:

- **The local government;**
- **A contracted (or exclusive franchise) hauler;**
- **A non-exclusive franchise hauler;** or
- **A subscription system in which residents select their own hauler** (which may need to be licensed or registered with the local government).

The decision regarding who provides the service may be made by the county, the municipality, or the homeowner's association. The strengths and weaknesses of these options are summarized in Table 3.1. More comprehensive information about contracting with private service providers is provided in Chapter 11.

Curbside Collection Methods

There are three commonly used methods for curbside collection. In choosing an option, recycling coordinators will need to evaluate compatibility with available equipment (or potentially available) and the local processing capacity.

1. SINGLE STREAM

- **Single stream is the most common method of curbside collection.** Residents place all accepted recyclables in the same cart/bin for collectors to load into trucks that have only one compartment for all of the mixed material. Material is then hauled to a processor.
- **This method is limited to communities that have access to a single-stream MRF** with equipment to separate and market material properly.
- **Hybrid programs include separate collection of glass.**

2. DUAL STREAM

- **Fibers** (e.g., paper products) **are placed in separate bins or compartments on the truck from commingled containers** (e.g., aluminum and steel cans, plastic bottles, glass jars).

- **In some cases, single-compartment vehicles are used,** and fibers and containers are collected on opposite weeks.
- **This method requires some basic sorting by the resident,** and may require collectors to place material in a specific compartment on the collection vehicle.

3. CURBSIDE SORT

- **This method involves the driver or a second employee sorting material at the curb** into separate compartments on the collection truck.
- **It is labor-intensive and relatively inefficient** due to the time involved in sorting at each stop.
- **It can yield the most valuable commodities** due to the low contamination rate.
- **This method is used in communities that have limited processing capacity for mixed material.** Different material may be delivered to different locations.



Curbside Recycling Containers & Collection Vehicles

CONTAINERS

The choice of residential recycling collection containers is tied to the choice of collection method and vehicle. Most local governments either directly provide containers or require their private hauler to provide them to residents. In many collection contracts, provision and maintenance of bins or carts is one of the items the service provider is required to address. In general, recyclables are usually collected using bins or wheeled carts.

Best practices regarding bins/carts are for the local government to:

1. **Provide free of charge** at the beginning of the program;
2. **Offer replacements at no charge or a nominal fee;**
3. **Have a way to deliver bins/carts** to new residents along with information about the recycling program;
4. **Include a sticker identifying what can go into the bin/cart** to prevent contamination;
5. **Use notification tags to alert residents of unaccepted material** in their bins and how to prevent contamination; and
6. **Warnings** (e.g., bin tag, letter) could be issued if the recycling program's policy is to remove a bin if repeated contamination occurs.

A free recycling bin communicates to residents that the local government sets a high priority on recycling. Bins/carts also serve as an icon and represent the program to the public. They also can provide peer pressure within a community to reinforce recycling behavior and provide a surface on which to affix program information.

The pros and cons of different types of curbside recycling containers are provided in Table 3.3.

VEHICLES

The types, configurations, specifications, and manufacturers of recycling trucks number in the hundreds, so choosing the correct vehicle can be daunting. Consider the following when choosing a vehicle:

- **Size to hold the tonnage of material expected;**
- **Compatibility** with method of collection (dual stream or single stream);
- **Design to allow efficient collection;**
- **Safety** for the operator. Driver training is important, even if a commercial driver's license (CDL) is not required;
- **Capacity and compatibility** with the recycling program. Make sure the one purchasing the vehicle is knowledgeable about the program;
- **Flexibility** for possible future program changes. Trucks fully depreciate in 7 to 10 years, so plan ahead when possible;
- **Impediments** along routes. Hydraulic arms are sometimes too cumbersome to use in tight



TABLE 3.2: Strengths & Weaknesses of Single-Stream Recycling

STRENGTHS	WEAKNESSES
Simple for resident - no separating material	Some residents do not believe material is being recycled when combined (perception issue). There also is a high chance of contamination.
Collectors do not have to hand sort at the curb, so collection is more efficient.	Requires material to be sorted at a single-stream recycling facility, which is generally more costly than a dual-stream recycling facility.
Compatible with cart collection which can allow for automated or semi-automated collection and possibly bi-weekly collection. Both reduce collection costs.	Incoming material must be stored inside at the MRF to keep dry or sorting equipment may not work properly.
Carts enable residents to store and recycle larger quantities of material and keep the material dry.	Sorting technology is imperfect and some mis-sorting may occur.
Carts provide greater convenience and can increase participation.	The cost of carts is greater than bins.
Collection vehicles require only one compartment resulting in more efficient collection and/or an ability to use existing vehicles.	Automated trucks are specialized and more expensive than standard recycling trucks, thus collection savings may be offset.
Vehicles can use controlled compaction of recyclables to allow greater on-route time and increased payloads.	
Automated collection reduces personnel costs and risks and can enhance the appeal of the collector position.	

TABLE 3.3: Pros and Cons of Different Types of Curbside Collection Containers

	BINS	CARTS	BAGS
General Characteristics	• 14-, 18-, or 21- gallons • Usually open-top • Not wheeled	• 35-, 65-, or 95-gallons • Wheeled • Have lids	• Often blue or clear film plastic
Pros	• Take up less space than carts • Less costly than carts	• Larger capacity encourages greater participation • Most find easy to maneuver • Compatible with automated collection • Can be compatible with bi-weekly collection • Material protected from the elements, reducing litter, and keeping material dry	• Relatively inexpensive • Compatible with collection using existing vehicle, such as pickup truck • No need to retrieve container • Material protected from elements • Can be compatible with bi-weekly collection
Cons	• Relatively small capacity - residents often stop recycling when full • Suitable for weekly collection only • Material not protected from elements • Not compatible with automated collection	• More costly than bins and bags • Some residents say they lack adequate space for carts • Some carts become windblown or roll on hills if not positioned carefully	• Ongoing cost • Likely disposed of at end of useful life • Generally, not compatible with automated collection • Bags have small capacity, may limit participation • Bags must be opened at recycling facility - slow process • Plastic bags may not be compatible with MRF equipment.

city locations or where there are low-hanging tree limbs and wires;

- **Dumping height, turning radius, and other factors** related to unloading material at the MRF or other processing locations. Overhead doors at MRFs have been ruined by trucks that were too tall for the facility;
- **Vehicle size** in comparison to the streets and possibly alleys that it will service. A larger truck can collect from more households and be more efficient, but if it ruins curbs and landscaping, it may not be a good value. Weight limitations for certain roads must also be taken into account;
- **Inclusion of global positioning systems (GPS) and idle controls and use of alternative fuels.** GPS can assist in optimizing routes and monitoring collection. Idle controls can reduce the amount of fuel used when the truck idles. At a minimum, diesel trucks should be able to use biodiesel and gasoline trucks should be able to use E-85 (an ethanol-based fuel);
- **Collection frequency.** See Table 3.4 to help decide how often a vehicle will collect from residences; and
- **Cost.** This is one of the major considerations. Leasing is an alternative to purchasing in order to reduce costs.

Signage on trucks also is important. Research in Charleston County revealed that the sign on a truck was the most obvious way that residents

knew who was picking up their recyclables. Also, trucks can be used as “traveling billboards” promoting the local recycling program.

The type of vehicle selected impacts the number of people required to operate the vehicle, vehicle cost, vehicle adaptability, and compatible container types. In general, there are manual collection vehicles, semi-automated collection vehicles, and automated collection vehicles. Table 3.5 provides a summary of the basic description of these vehicle types and the strengths and weaknesses of each type.

If your community contracts for collection, many of these considerations may still be a concern as they relate to the contractor’s vehicles. The recycling coordinator should prepare detailed criteria and specifications and include any maintenance manager’s input in the decision.

Drop-Off Recycling Programs

Many communities rely on drop-off sites for most or all of their recycling services. There are nearly 564 drop-off sites in South Carolina according to the “S.C. Solid Waste Management Annual Report for Fiscal Year (FY) 2024.” Most of them collect both garbage and recyclables. Some drop-off sites are located at transfer stations or landfills.

Drop-off sites serve many purposes, such as:

- **Providing primary means for the collection of recyclables in rural areas** where curbside collection may not be cost-effective;

TABLE 3.4: Curbside Collection Frequency: Weekly, Bi-Monthly or Monthly?

COLLECTION FREQUENCY	ADVANTAGES	DISADVANTAGES
Weekly (collect every week)	• Easiest for households to remember; • Yields the highest amount of material; and • Higher recycling participation.	• Higher cost for local governments; • More staff or staff availability needed; and • Greater wear on the vehicles.
Bi-Monthly (collect twice monthly)	• Can be cost effective especially in rural communities; and • Can be compatible with either single-stream or dual-stream collection.	• May confuse residents if collecting different materials each week; • High chance of contamination; and • Can be challenging for residents to remember when collection occurs. Holidays can further complicate the issue.
Monthly (collect once a month)	• Less wear on vehicles; and • Least expensive option.	• Residents may stop collecting recyclables after bin/cart is full.

TABLE 3.5: Options for Automation in Collection Vehicles

	MANUAL	SEMI-AUTOMATED	AUTOMATED
General Characteristics	- Collection workers manually place loads in proper bins. - Up to three crew members per vehicle needed - Vehicles can have multiple compartments to further sort material.	- A hydraulic lift is attached to vehicle. - Staff exit the vehicle to place container on the lift and then operate it. - May be operated with one- or two-person crew - Vehicle typically has only one compartment, possible to have two.	- Hydraulic arms are operated from within vehicle. - Typically, drivers do not leave cab of vehicle. - Only one operator is needed per vehicle. - Vehicle typically has only one compartment, possible to have two.
Strengths	- Compatible with any level of sorting - Allows for inspection of contamination before tipping load into vehicle hopper - Compatible with most types of containers, unless too heavy or bulky (e.g., large carts) - Many types of vehicles available - Fewer potential mechanical issues - Exact placement of containers not important	- Associated with reduction in injuries if the lift is used - Compatible with most container types. - Placement of containers not important - Crew can view load before tipping.	- More pleasant work conditions for driver - Associated with reduced worker injury - Relatively efficient (can serve more households in less time) - Results in reduced personnel costs
Weaknesses	- Relatively costly and inefficient system - May not be compatible with the use of large carts - Puts crew at risk for injury	- The lift cycle time can be slow. - Crew members still have to exit vehicle to operate. - Some crews opt not to use lifters to increase efficiency. - Hydraulic lifts can have mechanical issues.	- Vehicles are relatively costly. - Hydraulic lifts can fail/have mechanical issues. - Cart placement is important – requires educating residents. - Less opportunity to inspect loads for contamination before tipping - Compatible with cart collection only - Some areas have too many trees, cars, low-hanging wires, or other space restrictions to be practical



The Back of a Semi-Automated Recycling Truck



An Automated Recycling Truck



A Manual Recycling Truck

- **Supplementing curbside programs** by providing a collection site for recyclables (i.e., banned material or bulky, rigid plastic) that are not collected at the curb;
- **Having locations for collection events;** and
- **Providing opportunities for under-served populations** such as multi-family households or commercial establishments to recycle.

When assessing whether to open a new drop-off site, consider the following associated costs:

- **Container purchase or lease;**
- **Container maintenance;**
- **Land purchase or lease;**
- **Site preparation** (e.g., grading, paving, fencing);
- **Staffing;**
- **Servicing costs** per pull and/or tip;
- **Lighting/electricity for lighting** (if applicable);
- **Shelter with running water and a restroom** for site attendants;
- **Shelter to cover specific types of material** (e.g., electronics, batteries, motor oil);
- **Equipment to manage material collected** (e.g., electronics wrapper, pallets);

- **Signage and public education materials;**
- **Telephone or radio communications;** and
- **Safety/OSHA training.**

As with curbside collection programs, several service provider options are available to local governments for recycling drop-off sites. A summary of options is presented in Table 3.6.

Optimizing Drop-Off Sites

Drop-off sites are most cost effective when:

- **Participation rates are as high;**
- **Residents prepare recyclables properly;** and
- **Residents recycle as much quality material as possible** at the sites.

The drop-off sites must be appealing to the public and easy to use in order to ensure that these conditions are met. The recycling coordinator should consider taking the following actions to make sure the drop-off sites meet the needs of the public and are cost effective:

- **Ensure that the sites are well lit, clean, vermin-free, and safe;**
- **Provide adequate education and outreach to resident so they know what can be recycled at the site;**
- **Post clear directional signage** to the site;

TABLE 3.6: Drop-Off Recycling Service Provider Options

SERVICE PROVIDER	STRENGTHS	WEAKNESSES
Local Government	• The local government has maximum control over program; • Allows for flexibility in addressing issues that arise; and • Local government can choose collection container size and configuration.	• Local government is responsible for hiring, training, and maintaining staff which can be challenging in tight labor markets. • Local government must purchase or lease and maintain appropriate vehicles and equipment; and • Vehicles may not be fully utilized, resulting in diminished cost effectiveness.
Contracted/Franchise Provider	• Local government is not responsible for hiring, training, and maintaining staff. • Franchise fees may be paid to local government; • The contract/franchise agreement gives local government some control; and • The local government does not have to purchase/lease and maintain equipment.	• Requires monitoring of service and contracting process; and • Usually must accept equipment and vehicles the contractor has, with little or no opportunity to adapt to the community's needs.

- **Ensure that signage at the drop-off sites and on the containers is clear**, uses graphics, and is multi-lingual where appropriate;
- **Place recycling containers so they are at least as visible and convenient to access** as trash containers;
- **Ensure that there is ample space for servicing the containers** (usually a roll-off container requires 80 to 90 feet);
- **Ensure that the site is easy for people of all physical abilities to use** - no high steps or heavy lids;
- **Make sure traffic is well managed** (avoid having residents cross a line of traffic);
- **Ensure that the site is large enough to hold multiple containers** and has room for expansion, if necessary; and
- **Provide attendants** to staff the site, keep it clean, answer questions, and assist users.

Some communities may choose to share drop-off containers to minimize capital investment. For example, four municipalities may share a set of containers placing them in each community for one week of the month.

This type of a program requires additional outreach/education to ensure that residents are aware of the schedule. Because residents have a limited time frame to deliver recyclables to the site, these types of programs are likely to have lower participation and yield lower recycling rates.

Single-day collection events are popular for collecting hard-to-manage items (e.g., household hazardous waste, shredded paper, electronics). These events must be well advertised and the sites carefully chosen for accessibility, safety, and convenience.

Drop-Off Collection Containers & Vehicles

Factors to consider when evaluating the appropriateness of a particular container type for use at a drop-off site include:

- **The number and size of bins** at the site;
- **The number of drop-off sites expected to be developed** (relative to total volume of material collected);
- **The types of material generated/targeted and the acceptable degree of commingling** (i.e., the amount of sorting that the MRF will be required to do);
- **The space available** at each drop-off site;
- **Types of collection vehicles** to be used;
- **Accessibility for different types of trucks**, both on the ground (e.g., slope, grading) and overhead (e.g., power lines);
- **Traffic movement and safety**;
- **Ease of public use**;
- **Drop-off site layout that is user friendly** and encourages recycling over disposal; and
- **Special containers that may be required for material** (e.g., batteries, used motor oil, oil filters) that must be secured.

Three types of collection containers typically are used at drop-off sites to collect recyclables:

1. **Front-end load containers**;
2. **Roll-off containers**; and
3. **Trailers**.

FRONT-END LOAD CONTAINERS (Figure A)

- Common front-end load container sizes are 4-, 6-, 8-, and 10-cubic yards.
- Contents are tipped into a collection truck on site. One truck can visit many drop-off sites before it is filled to capacity.
- Front-end load containers are more suitable for lightweight, high-volume material such as cardboard since the collection vehicles compact the material. They also can be used to collect recyclables from commercial customers along the same route.
- Containers typically cost between \$950 and \$2,000.
- Front-end load trucks are large. They raise the containers high into the air and dump them into the compacting truck compartment using forks on the front of the truck. Therefore, they require space to load/unload and overhead clearance.

ROLL-OFF CONTAINERS (Figure B)

- Roll-off containers are larger than front-end load containers. Common sizes are 20-, 30-, and 40-cubic yards.
 - Roll-off containers can be outfitted with specially designed cutouts to accommodate certain types of recyclables and discourage users from depositing garbage bags or other contaminants. Built-in partitions, which can be adjustable to accommodate changing volumes of each recyclable, can keep different material types separated.
 - Containers are costly to service since they must be pulled one at a time.
 - A replacement container must be left when a full container is hauled from a drop-off site (requiring sufficient spare containers) or there will be no container for continued collection until the pulled container is returned.
- Compacting roll-off containers can be used for lightweight, high-volume material such as corrugated cardboard.
 - Costs range between \$3,900 and \$7,500 or more if compaction systems are included.
 - Vehicles that service roll-off containers use a hook and cable system to load the container onto the truck bed. When loading, they require enough linear space for the truck, the tilted and extended truck bed and the container. Therefore, overhead clearance requirements also need to be considered.

TRAILERS (Figure C)

- Recycling trailers generally have a relatively small capacity from 4- to 20-cubic yards.
- They can be relatively cost-effective to use because they can be hauled by a heavy-duty pick-up truck with a hitch or



Figure A: 10-cubic-yard front-end load container



Figure B: A 30-cubic-yard roll-off container



Figure C: 6 X 15-foot metal trailer with 5-foot sides



Figure D: A pre-sort box used by Pickens County

another type of truck (i.e., a dump truck) that a local government may already own.

- Trailers may be compartmentalized with the sections built into the structure of the trailer or with a number of separate bins that fit together onto the trailer frame. Trailers can unload: 1) using gravity; 2) using a hydraulic device that “tips” each compartment individually at the MRF; or 3) by removing individual bins with a forklift. Trailers may be used for permanent drop-off sites or for temporary, mobile drop-off recycling sites. Their portability without the need for special equipment makes them ideal for use at special events such as fairs, festivals, and sporting events.
- The cost of trailers can vary significantly, depending upon the size and complexity. They can range from about \$3,250 to as high as \$25,000.

Pre-Sorting Options at Drop-Off Sites

Counties may choose to use “pre-sort” boxes (Figure D) at drop-off sites. These boxes can be made out of wood or metal, are suspended on legs, and may have a mesh bottom.

Site users are instructed to place recyclables into these pre-sort boxes rather than the larger containers. Site attendants then sort the contents of the pre-sort boxes and place the desirable material into the larger containers.

A few of the benefits of using pre-sort boxes include:

- **Material that goes to the processor is very clean** and requires no further sorting;
- **Attendants may be able to minimize their direct interaction with users**, which some prefer; and
- **Attendants can monitor the types of contaminants that appear frequently** and, therefore, can assist program managers in targeting their educational messages. Similarly, new potentially recyclable material may be identified for possible inclusion in the program.

Some of the drawbacks of using pre-sort boxes include:

- **Liquids and small contaminants** like lids and cigarette butts may fall through the mesh bottom. This requires regular sweeping of the area under the pre-sort boxes to maintain a clean site;
- **Pre-sort boxes may fill up** before the attendant can service them (especially at particularly busy sites or during very busy times of the day); and
- **Opportunities to educate residents** about accepted material are limited.

Recycling Center Attendant Training

Drop-off site attendant training is a priority of the SCDES Office of Solid Waste Reduction and Recycling (Office). Recycling coordinators can request a free attendant training session from the Office that can be customized for local programs.

Training covers:

- **Overview of recycling** statewide and nationwide;
- **County solid waste management plans and ordinances**;
- **The importance of drop-off site attendants** to serve and educate the public, to foster good public relations, and to act as ambassadors for recycling;
- **Recognizing recyclables and ways to increase recycling rates**;
- **Tips for keeping the drop-off sites safe and attractive**;
- **Frequently asked questions and appropriate responses**;
- **Proper management of banned and miscellaneous items**; and
- **Resources available** from the Office.

Staffing a Drop-Off Site

If the local government decides to service its drop-off sites using its own staff, it must also own or lease the specialized vehicles that service either the roll-off containers or front-end containers used for material collection. Generally, local governments prefer to purchase roll-off collection containers and trucks, but collecting roll-off containers is time consuming as it requires multiple visits to each site.

If the distance to the processing center or market is a 30-minute drive, and if it takes 15 minutes to drop an empty roll-off container and pick up a full one, and another 15 minutes to access the processing center and unload, then a site with five full roll-off containers needing to be moved will require a full 7.5 hour work day. A county with five such sites will essentially need a full-time driver to accomplish this task weekly.

The economics may encourage counties to contract out the servicing of the roll-offs at the drop-off sites.

The Role of the Drop-Off Site Attendant

For many residents using drop-off sites, the only contact they will have with the program is through site attendants. Therefore, attendants are critical to the success of the recycling program as they are the face of recycling to the community. Drop-off sites staffed with knowledgeable attendants are more efficient than unstaffed sites.



While staffed sites cannot be available 24 hours per day, seven days per week, the positive attributes of a clean, safe, secure site with a knowledgeable attendant can compensate.

The role of the drop-off site attendant is to:

- **Assist residents** if they have questions about the program;
- **Encourage recycling** by approaching residents directly. Some counties use a “quota system” in which attendants are required to

approach a certain number of residents with information and friendly encouragement about recycling;

- **Ensure that recyclables are placed in the proper container;**
- **Ensure that littering, illegal dumping, and vandalism do not occur at the site;** and
- **Maintain a neat and orderly site.**

Recycling at Multi-Family Residences

Multi-family residences (MFR) are not typically included in residential programs and recycling on site is often not supported by management. Given that, for many communities nationwide, increasing recycling at multi-family residences is an important goal.

CHALLENGES OF MULTI-FAMILY PROGRAM

Many recycling coordinators find that establishing recycling programs for residents of MFRs can be quite a challenge.

- **Residents are often transient**, so providing frequent education as to what, how, and when to recycle is a must.
- **MFR programs often can be perceived as inconvenient** as residents usually have to carry their recyclables to a separate container.
- **Because there is no accountability** (it is unclear who places what in the container), MRF recycling can be highly contaminated.
- **Apartment managers may resist the program.**

STRATEGIES TO ENHANCE RECYCLING AT MFRs

In many cases, the key to overcoming barriers and implementing successful MFR programs is for the recycling coordinator to establish relationships and eventual partnerships with apartment building owners and managers.

The recycling coordinator can:

- **Understand barriers faced by managers** (e.g., lack of space, scavenging, cleanliness, cost) and identify ways to address them;

- ## Notes:

Chapter 3: References & Resources

- Earth 911, "Recycling Center Search and Recycling Guides" – earth911.com/recycling-center-search-guides/
- S.C. Department of Environmental Services, "S.C. Solid Waste Management Annual Report" – des.sc.gov/community/recycling-waste-reduction/solid-waste-and-recycling-reports
- The Recycling Partnership, various recycling resources including research reports, case studies, and grants – recyclingpartnership.org

- Earth 911, “Recycling Center Search and Recycling Guides” – earth911.com/recycling-center-search-guides/
- S.C. Department of Environmental Services, “S.C. Solid Waste Management Annual Report” – des.sc.gov/community/recycling-waste-reduction/solid-waste-and-recycling-reports
- The Recycling Partnership, various recycling resources including research reports, case studies, and grants – recyclingpartnership.org

Non-Residential Recycling: Businesses, Government & Schools



CHAPTER 4

Although recycling coordinators often see their role as primarily helping residents, there are many ways in which they can help increase non-residential recycling. Some ways include:

- **Raising awareness** on the importance of waste reduction and recycling;
- **Sharing ways** on how to manage hazardous or hard-to-manage material;
- **Responding to questions** about where specific material can be recycled;
- **Making the non-residential sector aware** of state (and local, as applicable) recycling goals, regulations, and resources; and
- **Encouraging data reporting** about recycling activities.

Because an estimated 50 to 60 percent of South Carolina's municipal solid waste (MSW) is generated by businesses, public agencies, and institutions, increased waste diversion from this sector is vital to meeting the state's recycling and waste disposal goals.

Non-Residential Sources of Solid Waste

Institutions, commercial establishments, and industrial operations are all sources of non-residential solid waste.

Unique Material Generation

Businesses generate all types of materials that can be recycled. Examples include:

- **Film plastic wrap or bags** that protect and contain merchandise and feedstock;
- **Shrink wrap** from marinas for boats during the winter season;
- **Plastic tubs** from supermarkets; and
- **HDPE (#2) strapping** used to secure boxes on pallets.

Some examples of these include, but are not limited to:

1. **Institutions** - Schools, colleges/ universities, governmental agencies, and other facilities (e.g., hospitals, nursing homes, prisons);
2. **Commercial Establishments** - Retailers, grocery stores, distribution centers, restaurants, lodging, pharmacies, entertainment and recreation facilities, personal care services, offices, and automotive shops; and
3. **Industrial Operations** - Manufacturing facilities, processing facilities, and industrial service providers (e.g., paper product converters, aluminum converters, secondary glass processors, printers, food-packaging facilities, sign painters, bottling plants).

Understanding the Non-Residential Sector's Needs

Many types of establishments may generate similar material. Different entities, however, may have specific requirements about how they manage certain waste types. For example:

- **Hospitals have strict guidelines** about how material (e.g., paper, plastic) that comes into contact with pathogens must be managed;
- **Many businesses and institutions require shredding** or other assured destruction of proprietary documents;
- **Product manufacturers may require assured destruction** for off-spec or expired products; and
- **Book and gift shops have specific requirements** about how unsold magazines and newspapers are managed.

It is important for recycling coordinators to understand specific requirements and work within the parameters of the institutions and businesses they are trying to help, as many of these constraints are required for proper risk management and legal compliance.

Commercial Establishments & Industrial Facilities

Increasingly, recycling coordinators realize that commercial and industrial facilities are prime targets for recycling programs. Much of the material that can be recycled is considered MSW and counts toward the state's recycling goal.

Recycling programs for high-volume material at these facilities can generate revenue. This material may be MSW (e.g., cardboard boxes) or non-MSW (e.g., trim scrap from a vinyl siding manufacturer). Recycling coordinators may be able to help these facilities identify other recyclables that are economical to recover, perhaps by conducting waste assessments.

Waste assessments can help identify opportunities for source reduction. Recycling coordinators may be aware of markets or resources to identify markets for material. In addition, they can encourage commercial entities to participate in competitions and recognition programs that promote recycling. The S.C. Department of Environmental Services (SCDES) Office of Solid Waste Reduction and Recycling's (Office) S.C. Smart Business Recycling Program provides resources to assist recycling coordinators in supporting these facilities. For more information, visit des.sc.gov/smartbiz.

In determining the waste to target from particular businesses, consider the following factors:

- **Amount of material;**
- **Marketability and value;**
- **Potential contamination;**
- **Available space** or how much material can be stored at the facility; and
- **Ease of recovery** (serviceability of the building or group of buildings).

There are many ways recycling coordinators can help establish and improve commercial and industrial waste reduction and recycling programs. Businesses generate waste, but minimizing this waste is not the business managers' and industrial plant operators' main goal. Coordinators can:

- **Help businesses establish a recycling program** that is integrated into the overall operation of the facility;

- **Encourage business recycling** by allowing businesses to use the recycling drop-off sites;
- **Assist in developing a system** to motivate employees;
- **Help businesses identify markets** for the material they generate;
- **Help identify cost savings** through source reduction or recycling material;
- **Provide enhanced public image;** and
- **Offer award programs** to highlight their successful work in reducing waste and recycling.

Also, many businesses now have corporate sustainability goals. Recycling and source reduction programs support these goals.

Other Institutions

Other institutions (e.g., hospitals, nursing homes, places of worship, recreational facilities) generate material that can be targeted for waste reduction and recycling programs. The recycling coordinator can be a resource in helping these institutions overcome their unique recycling constraints.

Smart Business Recycling

Businesses (i.e., commercial, industrial) comprise about 40 to 50 percent of reported recycled material in South Carolina each year. Given that, it is essential to have businesses report recycling efforts. Recycling coordinators can encourage businesses to report directly to the Office. The S.C. Smart Business Recycling Program is a free, confidential initiative for businesses designed to:

1. **Help reduce their environmental impact;**
2. **Provide technical assistance** to begin or expand waste reduction and recycling programs; and
3. **Recognize recycling and sustainability efforts** with an annual awards program.

The program - created by the Office - offers these services through phone/email consultations, site visits, workshops, and other resources. For more information, visit des.sc.gov/smartbiz.



Recycling coordinators can provide:

1. **Recycling containers;**
2. **Information about markets;**
3. **Collection services;** and/or
4. **Information about local service providers.**

Governmental Agency Recycling Programs

While most S.C. state government offices are located in Columbia, many agencies (e.g., SCDES, S.C. Department of Social Services) have offices throughout the state. Recycling coordinators can assist local offices of state agencies, state parks, and local government offices in setting up waste reduction and recycling programs. In addition, recycling coordinators are encouraged to persuade these entities to report their recycling activities using Re-TRAC. The Office offers technical and educational assistance to state agencies through the Green Government Initiative.

For more information, visit des.sc.gov/community/recycling-waste-reduction/state-agency-recycling-responsibilities.

K-12 School & College/University Recycling Programs

While recycling coordinators may not establish recycling programs at schools and colleges/universities themselves, they can work with staff and volunteers within these institutions to provide guidance and resources to assist them. Recycling coordinators may be more actively involved in setting up recycling programs at K-12 schools.

The Office provides resources for both school and college/university recycling programs. See Chapter 16 for more information.

Re-TRAC Connect

Re-TRAC Connect is the web-based solid waste data management system used by the Office to provide businesses, local governments, colleges/universities, and state agencies a free and convenient tool to report their recycling activities. See Chapter 13 for more information about reporting and Re-TRAC Connect.

The key players to involve when implementing a recycling program in a school or college/university setting include:

- **School administration;**
- **Operations staff;**
- **Custodial (or housekeeping) staff;**
- **Advocate** (i.e., someone who is on site and will oversee and promote the program, ensure that students and staff are participating, and take action when there is room for improvement);
- **Cafeteria/dining staff** (or service providers); and
- **Food and beverage suppliers.**

USC Leads by Example

The University of South Carolina's (USC) highly successful campus-wide recycling program includes easy-to-access collection bins, collection centers for mixed recyclables in residence halls, special events, and more.

USC recently added a recycling facility to the mix. Introduced in May 2025, the 9,000-square-foot mini-MRF includes the program's first mechanized sorter, a four-station conveyor-belt sorting line for processing larger volumes of recyclables, space for e-waste collection and storage, universal waste collection and storage, and staff offices. Larry Cook, USC's Director of Sustainability, says operating its own MRF on campus offers ways to improve and grow the program. The MRF will:

- **Make sorting of material more efficient and reduce contamination** resulting in a higher market value for the recycled commodities;
- **Improve the program's current diversion rate of 30 percent;** and
- **Provide an additional opportunity for outreach/education** and program transparency to students, faculty, and staff.

USC's recycling program has grown into a comprehensive operation. Initiatives include:

- **Stadium Recycling** – Trash and recycling containers are placed throughout Williams-Brice Stadium and parking areas;
- **Food Waste Minimization** – USC's vendor's sustainable business management practices include food donations, recycling, and composting. USC also is an Ambassador of the Don't Waste Food SC campaign developed by SCDES.
- **Move-in Cardboard Recycling** – This initiative sets up designated areas for students to recycle their empty boxes after unpacking; and
- **Give It Up for Good** – This initiative – offered during the final three weeks of the spring semester – provides instructions to students on where to donate unwanted items to charities.

Colleges & Universities Provide Waste Reduction Opportunities

College and university programs differ from local government programs in operational scale, population dynamics, funding, and educational opportunities – resulting in distinct opportunities and challenges. See examples below.

OPPORTUNITIES

- **Usually relatively small area given the population** – provides opportunities to collect materials with relative efficiency
- **Existing communication pathways** include:
 - Student community texts, emails, newsletters, and electronic billboards in place for communicating with students, faculty, and staff; and
 - Many groups (e.g., residential life, academic departments, Greek organizations, sports teams, clubs) exist with their own communication systems through which information can be shared).
- **Many in-person events and locations** – offering opportunities for meaningful one-on-one conversations about recycling
- **Specific dining areas** – present an opportunity for a reusable to-go containers program
- **Move in/out day** – partner with local organization that will donate items to community
- **Food composting** – large quantities generated in specific key locations
- **Events** – compostable eating utensils and food waste – present an opportunity to compost on a large scale
- **Opportunity to work with purchasing** to support local compost, recyclable, recycled content
- **Many potential volunteers** to help implement programs
- **Clubs/departments on campus** may have an interest in managing recycling and education programs or even developing and implementing surveys
- **Possible opportunities** to collect batteries and other challenging materials relatively efficiently in certain on-campus departments/facilities

CHALLENGES

- **Students come from different locations** – have to learn how recycling works on campus as it may differ significantly from home
- **Students are busy and their interests can change** – expect turnover in population and volunteers. Ways to combat:
 - Offer SWAG to volunteers and in some cases participants;
 - If possible, allow students to take on a significant role to build their resume;
 - Identify opportunities to pair academics with recycling programs; and
 - Engage staff and faculty to champion certain programs.
- **It can be overwhelming to start a program** because there are so many potential locations where recyclables can be generated. To combat this:
 - Identify where recyclable materials are generated and what types of materials are generated;
 - Begin with the “low-hanging fruit” where the most material is generated and is relatively simple to manage, and add from there;
- Locations and events to consider targeting include:
 - Book stores and other retail locations;
 - Cafeterias, dining halls, and conference facilities;
 - Athletic and cultural events;
 - Move-in/move-out days;
 - Athletic facilities;
 - Residence halls and apartments;
 - Classrooms, offices, and labs;
 - Social/Greek events;
 - Construction and demolition activities; and
 - Grounds maintenance activities.

The recycling coordinator may assist college/university recycling professionals by:

- **Providing ideas and material** for education, outreach, and motivation;
- **Helping** ensure that the “nuts and bolts” of program implementation are covered;
- **Identifying haulers** to transport material and markets for challenging material;
- **Providing containers** or other logistical tools for the program;
- **Providing advice** on how to hold a recycling competition with other schools;
- **Providing guidance on monitoring dumpster activity** to determine if waste volume/collection frequency can be reduced;
- **Providing program feedback**;
- **Providing advice about contract provisions** that help meet waste reduction goals;
- **Emphasizing how monitoring data** can help identify issues and enable them to be managed quickly; and
- **Ensuring that data** regarding tons recycled and/or disposed of is monitored and reported directly to the Office or Re-TRAC Connect.

Recycling System Design Options for Non-Residential Collection

Designing a recycling system for a non-residential generator requires selecting the proper point-of-generation (often called internal) containers, transitional storage (if needed) and point-of-collection (called external) containers. Recycling should be at least as convenient as disposal. Some businesses and institutions try to make recycling containers more prevalent, which can work well if staff are dedicated and do not contaminate recyclables with trash.

A recycling program should meet the needs of waste generators as well as the needs of custodial staff, hauler, processor and end markets. Below are some considerations.

- **Selection of Interior Collection Containers** – There are many options for internal recycling container usage and for moving recyclables to the external containers. The recycling coordinator can help in the selection of

internal recycling containers, keeping in mind that they must be:

- Adequate in size for the amount of material generated and frequency of service;
 - Conveniently located;
 - Not overly cumbersome to carry and empty;
 - Clearly labeled and visually distinct from trash receptacles;
 - Kept clean; and
 - Designed to discourage contamination (e.g., made of clear plastic or with restrictive openings).
- **Selection of External Recycling Containers** – Selection of these containers (i.e., ones to be

Horry County Helps Schools

The Horry County Solid Waste Authority (HCSWA) offers the following free educational programs, services and contests for recycling and waste reduction in Horry County Schools.

- **School classrooms and cafeterias** are provided bins for commingled recycling.
- **Field trips, presentations, and landfill and MRF tours** are available to schools. The HCSWA reimburses schools for fuel charges, and if needed, substitutes.
- **Environmental grants** up to \$250 are available for qualified projects.
- **Talkin' Trash** is a recycling competition for fourth-grade classes in county elementary schools. Rewards are provided to the school that collects the most recyclables.
- **Protect Our Planet** is an art contest in which students create artwork made from used aluminum can tabs to win prizes.
- **Environmental scholarships** are provided yearly to Horry County high school seniors.
- **Recycling Student of the Year** is an award given to the outstanding student recycler in Horry County.

served by the hauler) depends largely on the following factors:

- The types of recyclables and how they must be separated;
- The volume collected;
- Frequency of collection;
- Hauler requirements and equipment;
- Space constraints; and
- The types of interior containers being used.

It is important that point-of-collection containers protect material from the elements, particularly wind.

- **Emptying Containers** – Responsibility for emptying recycling containers must be made clear. In some offices, workers are asked to empty their own containers into centralized containers. Typically, janitorial or custodial staff has the ultimate level of responsibility.

The cooperation of the custodial staff is essential for a successful program so it can be helpful to solicit their input when designing the program. Since custodial staff and other employees often have high turnover rates, new-hire training and frequent re-training of employees is vital. Multi-lingual material and signage may be needed. Since they often work unobserved or in the off-hours, scheduling regular contact with custodial staff can be challenging, but it is important to provide them with feedback about the program.

Businesses and institutions may look to the recycling coordinator for the information and resources needed for this continuing education challenge. Improper handling of recyclables may cause the program to suffer. Similarly, other employees also benefit from reminders and re-training regarding what material to recycle, where to recycle, and the benefits of participating in a recycling program. To the extent that upper management expresses support for the program, businesses and institutions can expect higher participation rates.

- **Identifying Additional Opportunities** – The recycling coordinator can help conduct or provide instructions to businesses for a waste audit, which can point to opportunities for improvement (e.g., to capture more material, reduce contamination, improve efficiencies). Also, there may be material that is not yet being targeted in the recycling program that the recycling coordinator can identify.

Chapter 4: References & Resources

- Practice Greenhealth – practicegreenhealth.org
- S.C. Budget and Control Board, Procurement Services – procurement.sc.gov
- S.C. Department of Environmental Services – des.sc.gov
 - “Action for a Cleaner Tomorrow” (K-12) – takeactionsc.org
 - Recycle U Program – des.sc.gov/recycleu
 - K-12 Recycling Education Grant Program – des.sc.gov/community/k-12-schools-students-teachers/contests-grants/recycling-grant-funding-k-12-schools
 - Recycling Guide for Schools – des.sc.gov/sites/des/files/Library/OR-1519.pdf
 - S.C. Smart Business Recycling Program – des.sc.gov/smartbusiness
 - Be Battery Smart, A Guidance Document for SC Schools – des.sc.gov/sites/des/files/Documents/BLWM/Recycling/OR-2575.pdf
 - Composting, A Guide for South Carolina Schools – des.sc.gov/sites/des/files/Library/OR-1520.pdf
 - Reducing Food Waste, A Guide for South Carolina Schools – des.sc.gov/sites/des/files/Library/OR-1522.pdf
- S.C. Materials Exchange – scmaterialexchange.org
- S.C. Recycling Markets Directory – recyclinginsc.com/directory/
- Sonoco Recycling, Education & Resources – sonocorecycling.com/educationresources.aspx
- U.S. Environmental Protection Agency, Sustainable Materials Management – epa.gov/smm

Managing Banned Items



CHAPTER 5

What is banned?

The S.C. Solid Waste Policy and Management Act of 1991 (Act) bans five items from landfill disposal:

1. **Used motor oil** (Section 44-96-160)(A)(1);
2. **Used motor oil filters** unless crushed to the smallest practical volume or “hot drained,” according to South Carolina’s used oil regulation (Section 44-96-160(B) and S.C. Regulation, R.61-107.279);
3. **Whole waste tires** (Section 44-96-170)(G);
4. **Lead-acid batteries** (e.g., car, truck, boat) (Section 44-96-180)(L)(2);
5. **Large appliances** referred to as “white goods” in the Act (Section 44-96-200)(B); and

The Act (Section 44-96-190)(B) also bans yard trimmings from Class 3 municipal solid waste (MSW) landfills, but the material can be disposed of in Class 2 (construction and demolition debris) and Class 1 (land-clearing debris) landfills.

The S.C. Manufacturer Responsibility and Consumer Convenience Information Technology Equipment Collection and Recovery Act (S.C.

Code of Laws, Section 48-60-05 et seq.) bans computers, computer monitors, printers, and televisions from disposal in a landfill.

Used Motor Oil

Used motor oil is not only banned from disposal in South Carolina landfills, it also is illegal to dispose of in sewers, drainage systems, septic tanks, surface water, groundwater, and on the ground. In addition, oil may not be used for road oiling, dust control, weed abatement, or other applications that may cause harm to the environment. In short, used motor oil **MUST** be recycled. There is a statewide contract that local governments can elect to use to recycle used motor oil from residents who change their own oil (do-it-yourselfers or DIYers). Used motor oil filters and bottles also are collected from DIYers in most counties.

Collection tanks should be set up to accept:

1. **Used motor oil;**
2. **Oil/gasoline mixtures;** or
3. **Used motor oil generated on farms.**

Environmental Benefits of Recycling Used Motor Oil

Recycling used motor oil benefits human health and the environment through:

- **Keeping it from contaminating soil, rivers, lakes, streams, groundwater and beaches** to protect aquatic life, wildlife, and recreational areas. One gallon of used motor oil improperly disposed of may contaminate 1 million gallons of fresh water – enough to supply 50 people with drinking water for one year;
- **Saving energy.** Two gallons of used motor oil can generate 36 kilowatt-hours of electricity. That’s enough to run an average household for a day, cook 36 meals in a microwave, use the blow dryer 216 times, vacuum the house for 15 months or run a television for 180 hours; and
- **Helping to use fewer natural resources.** Used motor oil can be reprocessed and used in furnaces for heat, power plants to generate electricity, and as lubricating oils.



For more information about collection and storage, see the box below.

There are several recommendations to consider when storing used motor oil. Specifically, collection tanks must be:

- **Placed on concrete pads or paved areas;**
- **Under a cover** (e.g., carport) to prevent runoff from rainfall or spills that could contaminate surrounding land; and
- **Labeled clearly** and appropriately.

Tanks should be located where staff is present and access is restricted after business hours. Most local government collection centers and retail locations accept a maximum of 5 gallons of used oil per trip.

COLLECTION OF OIL/GASOLINE MIXTURES

Oil/gasoline mixture collection sites are designed to accept motor oil, gasoline, and oil/gasoline mixtures from lawn equipment and recreational vehicles (e.g., leaf blowers, boats, motorcycles). The sites also accept the same petroleum products as standard used oil collection tanks.

The oil/gasoline mixture tanks typically hold 500 gallons, but 275-gallon tanks also are available.

The requirements for establishing an oil/gasoline mixture collection site are more stringent than for typical used motor oil collection sites. In particular, oil/gasoline mixed sites must:

- **Meet the requirements of the National Fire Protection Association (NFPA) Codes and Standards;** and
- **Be approved by a local fire marshal or the Office of the State Fire Marshal.** The fire marshal can provide a copy of the NFPA Codes and Standards.

See the box below for the guidelines and requirements when establishing an oil/gasoline mixture collection tank.

USED MOTOR OIL FROM FARMS

According to South Carolina's used oil regulation (R. 61-107.279), farms are considered generators of used motor oil and, as a result, must follow certain management practices based on the amount generated.

Collection & Storage of Used Motor Oil

Drop-off sites typically have one tank. It is important to note that a variety of petroleum products (e.g., kerosene, transmission fluid, diesel fuel) can be placed in the tanks. Gasoline, however, only can be placed in gasoline/used motor oil mixture tanks.

ACCEPTED

- ✓ **Motor oil;**
- ✓ **Heating oil;**
- ✓ **Automatic transmission fluid;**
- ✓ **Gear oil;**
- ✓ **Diesel fuel;**
- ✓ **Power-steering fluid;**
- ✓ **Fuel oil;**
- ✓ **Kerosene;** and
- ✓ **Hydraulic fluid.**

NOT ACCEPTED

- ✗ **Water;**
- ✗ **Refrigeration oil;**
- ✗ **Gasoline** (unless it is an oil/gasoline mixture tank);
- ✗ **Brake fluid;**
- ✗ **Paint thinner;**
- ✗ **Fats, cooking oils, and grease;**
- ✗ **Any solvent or cleaner;**
- ✗ **Antifreeze;** and
- ✗ **Any substance** used to clean paint brushes.

Guidelines & Requirements for Oil/Gasoline Mixture Tank Installations

1. Tanks must be constructed of steel or other approved noncombustible material (NFPA 30 21.4.1).
2. Tanks must be built per a recognized standard of design (UL142, UL2080, UL2085, API 650, etc.) and installed per NFPA 30 21.4.2.1.1.
3. Approved means (e.g., impounding around tanks by diking) must be provided to prevent accidental discharge to waterways and adjoining property as well as protect important facilities (NFPA 30 22.11).
4. Diking should be:
 - Steel, concrete or solid masonry;
 - 10 feet from any property line;
 - Designed to contain the full volume of the tank; and
 - Sloped away from the tank at a minimum 1 percent slope (NFPA 30 22.11.2).
5. The tank must have normal vents sized (per American Petroleum Institute 2000), no less than 1.25 inches nominal inside diameter (NFPA 30 21.4.3.2).
6. Emergency relief venting is required for the tank (NFPA 30 22.7.1.1).
7. Vent pipe outlets for tanks must be located so that the vapors are released not less than 12 feet above the ground level (NFPA 30 27.8.1.1 and 22.6).
8. Tanks must rest on foundations designed to minimize corrosion in any part of the tank resting on the foundation (NFPA 30 22.5.2.1 and 22.5.2.2).
9. Tanks in areas subject to flooding must be prevented from floating (attached to a foundation of sufficient weight to offset buoyancy of the tank when submerged) during a rise in water level up to the established maximum flood stage (100-year flood per current Federal Emergency Management Agency maps) (NFPA 30 22.5.2.5).
10. All tanks and connections must be tested for tightness at operating pressure with air, inert gas or water prior to placing the tank in service (NFPA 30 21.5.2 or 21.8.3). If your plans are reviewed by the Office of State Fire Marshall, the Deputy State Fire Marshal assigned to your county should be contacted to allow him/her the opportunity to witness this testing. If you don't know who to contact, please see the list on the State Fire Marshal's website at statefire.llr.sc.gov/osfm/codeenforcement.aspx (scroll to bottom and click on "SC Deputy State Fire Marshal Region Lookup").
11. The choice of material for piping, valves, and fittings is important. The use of low melting point material (e.g., aluminum, copper, brass) and material that soften on fire exposure is restricted. Such material, however, is permitted to be used in underground piping. Also, not all types of iron are permitted to be used. Nodular iron (malleable wrought iron) is allowed, but cast iron is prohibited. (This requirement does not refer to the internal working parts of a valve.) Lastly, valves at storage tanks and their connections to the tank must be of steel or modular iron. See the code for more details (NFPA 30 27.4.3 and 27.4.4).
12. The tank must be located in accordance with NFPA 30 Table 22.4.1.1(a) and Table 22.4.1.1(b). The typical tank described above is required to be a minimum of 20 feet from property lines and 5 feet from the nearest side of a public way (e.g., road right-of-way, utility easement passing through the property) or from the nearest occupied building on the same property [NFPA 30 22.4.1.1, Table 22.4.1.1(a) and 22.4.1.1(b)].

- **Farms that generate more than 25 gallons of used motor oil in a month** must store the oil in a container with no leaks or visible rusting. The containers must be labeled as "Used Motor Oil."
- **Used motor oil from farm machinery is not considered DIYer used motor oil** and may not be collected in DIY tanks.
- **Farmers who transport more than 55 gallons of used motor oil at any time must register** with the S.C. Department of Environmental Services (SCDES) Division of Compliance and Enforcement.

Farms that generate an average of 25 gallons or less of used motor oil per month from vehicles or machinery in a calendar year are not subject to the requirements of this regulation, but they should follow best management standards and practices in handling used motor oil.

To assist with the proper management of used motor oil generated on farms, the SCDES Office of Solid Waste Reduction and Recycling (Office) continues to encourage local governments to establish used motor oil recycling sites for farmers generating 25 gallons of used motor oil per month or less.

Agricultural oil tanks are designed to hold the larger quantities of oil that farmers generate. The

tanks typically hold 600 gallons of used motor oil. They are fitted with a pump and hose in an effort to make it easier for farmers to deliver up to 55 gallons of used motor oil at one time. Agricultural oil tanks are capable of accepting the same petroleum products as a standard used oil collection tank.

USED MOTOR OIL FILTERS

According to the state's used oil regulation (R. 61-107.279), used motor oil filters are banned from Class 3 municipal solid waste (MSW) landfills unless they are "hot-drained for a minimum of 12 hours" or "compacted to their smallest practical volume."

The collection of used motor oil filters is an important part of the overall recycling program because filters can contain from 4 ounces to 1 quart of oil. Most of the filters recycled in South Carolina are sent to steel mills. Many local governments collect used motor oil filters from residents, store them in 55-gallon drums, and work with a recycling vendor.

Some local governments drain and crush the filters and sell them to a scrap metal vendor. Local governments that collect the filters are required to have the 55-gallon drum on a concrete pad and covered – usually located next to the used motor oil tank. There is a state



Pictured: A motor oil filter drain rack

contract available to manage used motor oil filters. Local governments that use the contract:

- **Do not need to consolidate filters** in one location;
- **Do not need to crush used oil filters** prior to collection; and
- **Can be reimbursed for expenses** incurred through the use of the contract with a Used Motor Oil Recycling Grant from the Office.

EMPTY MOTOR OIL BOTTLES

Oil bottles also are an important target for recycling because they are made from a plastic (i.e., high-density polyethylene or HDPE) that can be recycled and can contain as much as 1 ounce of oil per bottle that should be recovered. Empty motor oil bottles are typically collected in one of two ways:

1. **In stand-alone 55-gallon drums** placed next to the used motor oil tank (must be on a concrete pad and under an overhead cover). It is recommended that drum covers be placed on the 55-gallon drums; or
2. **With other HDPE (#2) plastic bottles**, after drained for a minimum of 6 to 8 hours, using oil bottle drain racks.

Oil bottle drain racks:

- **Consist of a series of perforated PVC pipes** mounted to a metal frame that securely hold the necks of bottles in place;
- **Are usually designed to drain multiple oil bottles** at a time and collect the residual oil for recycling; and
- **Should not be used to drain oil bottles overnight.**



Pictured: Typical motor oil bottle drain racks

See it. Report it.

The “See It, Report It” campaign – developed by SCDES in partnership with PalmettoPride and the S.C. Department of Natural Resources, encourages residents to quickly and anonymously report illegal tire dumps in their communities.

Residents should never let someone dump tires on their property. Landowners could be held liable for cleanup costs.

Residents can call PalmettoPride’s Litter Busters Hotline at **1-877-7-LITTER** or use the “Litter Busters Hotline” option online – palmettopride.org. All information is held in strict confidence and the caller’s identity is not released. Another option for residents to report tire piles via the SCDES website – des.sc.gov/report-it – or call **(803) 898-3432**.



Whole Waste Tires

The Act bans whole waste tires from landfills and requires retailers to collect a \$2 fee for each new or used tire sold. The revenue from the tire fee is split among the counties and SCDES, and is used to ensure that waste tires are properly managed and recycled. See Chapter 12 for more information on fees.

Improper disposal of waste tires is problematic in many ways such as:

- **Being a nuisance, a visual blight and a potential public health hazard** as they are breeding grounds for insects (especially mosquitoes);
- **Presenting a fire hazard** especially if dumped in large quantities; and
- **Having a tendency to rise to the surface and become exposed when buried whole in landfills**, causing operational, and safety issues.

All counties have certain roles and responsibilities to increase the recycling of waste tires according to the Act.

PLANNING

Each county is required to have a waste tire management plan in place. Tire plans should include a comprehensive discussion of how tires from various sources will be managed. SCDES encourages counties to describe their strategy for managing illegal waste tire dumps and stockpiles in their plans. Cities and towns have no specific responsibilities under the Act for managing waste tires, but they and their host counties are encouraged to work cooperatively to manage waste tires collected from residents.

COLLECTION/RECYCLING

Counties should designate at least one central collection site for waste tires from local tire retailers although acceptance of waste tires from retailers is optional. Counties are required to designate at least one site to accept tires from residents. In order to prevent tire dumping, counties are encouraged to have more than one location that accepts tires from residents and to accept small quantities of tires without requiring fee documentation.



Recycled Tire Products

The majority of tires recycled in South Carolina are used as tire-derived fuel (TDF), while a lesser amount are used in civil engineering applications. Common uses for recycled tires include:

- **TDF** – Cement kilns, steel arc furnaces, and paper mills can use waste tires as fuel. Usually tires are processed into shreds or chips, although some plants can accept whole tires.
- **Civil Engineering Applications** – Often tire-derived aggregate (TDA) and tire shreds can take the place of other material in civil engineering applications. TDA can be appealing because of its:
 1. Low cost (depending upon alternatives and available processors);
 2. Permeability;
 3. Relatively light weight; and
 4. Vibration and sound damping properties. Examples include:
 - Lightweight fill;
 - Drainage medium;
 - Drainage/insulation layer in driveways, sidewalks, and other applications;
 - Backfill over pipelines; and
 - Drainage medium in septic system leach fields.
- **Rubberized Asphalt** – Rubber-modified asphalt or rubberized asphalt concrete is ground rubber incorporated into asphalt. Benefits include reduced maintenance costs, reduced cracking and rutting, and decreased noise levels. Crumb rubber also can be used as mulch, in synthetic turf fields, in pour-in-place products, and as feedstock for manufacturing products.

Counties must recycle the tires themselves or use an approved waste tire recycling and processing facility. Local governments that hire haulers/processors should perform due diligence to ensure tires are being handled properly.

MANAGING STOCKPILES/ILLEGAL DUMPS

Each county is required by law to participate in ongoing waste tire clean-up enforcement efforts. Counties should contact their SCDES Regional Office when illegally dumped or stockpiled waste tires are located. To report illegal tire piles, visit SCDES website at des.sc.gov/report-it or call **(803) 898-3432**. SCDES may be able to assist in identifying the responsible party. For an SCDES office in your area, visit des.sc.gov/about-scdes/locations.

Costs for the removal of illegally dumped or stockpiled tires should be borne by the responsible party. County policy may allow negotiated use of funds received from the S.C. Department of Revenue (SCDOR) to assist property owners in the management of waste tire stockpiles. Waste tire grant funding may be requested for stockpile remediation after appropriate compliance and enforcement efforts have been attempted or as dictated by human health risks.

CHARGING FEES

Recent amendments to South Carolina law have changed many aspects of tire management in South Carolina. Counties were once prohibited from charging a fee for any tire on which the fee already had been paid when the tire was originally purchased. Tipping fees of up to \$1.50 per tire or up to \$150 per ton now may be charged for tires included in ST-390 documentation. Tires without the ST-390 documentation may be charged a tipping fee of up to \$400 per ton.

The list of tires below may be charged fees beyond \$400 per ton:

- Tires larger than those requiring a U.S. Department of Transportation number (e.g., heavy-equipment tires from farming, logging, and mining operations);
- Tires generated outside of the state;
- Fleet tires with no documentation that a fee has been paid; and
- Pre-consumer tires manufactured in South Carolina for which no fee has been paid.

FUND MANAGEMENT

Funds that counties receive from SCDOR for their portion of tire fee revenues are to be kept separate from the county's general fund (or accounted for separately) and are to be used only for the collection, processing, or recycling of waste tires.

FUNDING SHORTFALLS

Costs to the county for tire recycling in excess of the sum of SCDOR allotment and tipping fees charged for waste tires are considered "shortfall" costs. If counties exhaust their allotted tire funds and have a shortfall, they may request additional funding in the form of a Waste tire grant from the Office.

Counties that have a policy for accepting waste tires free of charge from automobile dismantlers may apply for Waste Tire Grants to cover their shortfall costs for accepting them. Dismantlers should be required to remove tires from rims and deliver them to the central county collection site.

LEGAL REQUIREMENTS OF WASTE TIRE HAULERS & PROCESSORS

The state's waste tire regulation (R. 61-107.3) addresses most waste tire activities. Some basic requirements of haulers and processors include:

- In general, any entity that hauls 15 or more waste tires per year must be registered as a waste tire hauler and report annually to SCDES. Any load of 15 or more waste tires should be accompanied by a manifest (SCDES Form D-2738) to document the origin and quantity of the waste tires being hauled and to document delivery of the tires to an SCDES-approved facility.
- Unless otherwise exempted, tire collection sites are required to have a waste tire collection permit. Permitted solid waste facilities that store fewer than 2,500 tires are not required to have a collection permit;
- All waste tires must be stored so as to prevent and control mosquitoes and other human health nuisances; and
- Records should be kept of the pest control activities and be made available upon request.

SCDES encourages local governments to collect waste tires in such a way as to keep them as dry and clean as possible. The use of some combination of concrete pads, containers, trailers, buildings, and/or other cover is strongly recommended.

Lead-Acid Batteries

Lead-acid batteries are used in automobiles, trucks, boats, and motorcycles. As with most banned items in South Carolina, there is an advance recycling fee of \$2 with a \$5 refundable deposit on the sale of lead-acid batteries to fund the recovery and recycling of this material. Retailers of lead-acid batteries, therefore, must accept the spent battery upon purchase of a new one.

COLLECTING & STORING LEAD-ACID BATTERIES

- **Collection** - Because lead-acid batteries require special care during collection and storage, they are not suitable for collection in curbside programs. Counties should offer drop-off site collection programs for residents who are unable to deliver batteries to a retailer. Batteries should be handled with care and inspected by the attendant for leakage.
- **Storage** - Lead-acid batteries should be stacked upright on pallets or placed in containers. They are heavy and should not be stacked too high or placed in too large of a container. They should be stored on pallets or cement pads and protected from the weather by a carport cover or other shelter.



Pallets should be shrink wrapped to protect the integrity of the load and the batteries from rainfall - as any acid leaking on the outside of the batteries could contaminate run-off water. Battery collection areas should be monitored and no smoking should be allowed in these areas.

POTENTIAL MARKETS

Generally, markets for lead-acid batteries are plentiful. More than 97 percent of all battery lead is recycled. A typical new battery contains 60 to 80 percent recycled lead and plastic (polypropylene). Usually a scrap metal recycler will pick up the lead-acid batteries from the collector, extract the lead, and then sell the empty casings to plastic recyclers. Some large lead-acid battery manufacturers and distributors have established their own recycling services.

Yard Trimmings

Yard trimmings and land-clearing debris are banned from disposal in Class 3 (MSW) landfills, but can be disposed of in Class 1 (LCD) and Class 2 (C&D) landfills. More information about this material is provided in Chapter 8.

Large Appliances

Large appliances (also known as white goods) are defined in the Act to include refrigerators, stoves, water heaters, freezers, dishwashers, trash compactors, washers, dryers, air conditioners, and commercial large appliances. All are banned from disposal in Class 3 (MSW) landfills. To promote the recycling of large appliances, there is a \$2 advance recycling fee. See Chapter 1 (Table 1.1) for more information.

Appliances are easily recycled - saving considerable landfill space - and are a valuable commodity. In fact, nationwide a vast infrastructure has been developed around the recycling of end-of-service steel appliances as well as other steel material. Options for residential collection of large appliances include curbside or drop-off collection.

- **Curbside Collection** - Local governments that provide curbside collection can collect large appliances either with manually loaded trucks or trucks with grapple arms. Collection may be provided at no charge, or the local

government or the hauler may charge a fee for special pickup. Local governments should clearly communicate scheduled pick-up days to residents (and scheduling instructions, as applicable) and instruct residents to remove doors from refrigerators and freezers before placing them at the curb for safety reasons.

- **Drop-Off Collection** – Many local governments collect large appliances at drop-off sites. The following best management practices can help ensure efficiency and safety in managing large appliances and can help maximize revenue.
 - Place roll-off containers (on cement pads when possible) at each drop-off site and dedicate them solely for scrap metal and appliances.
 - Use clear signage on containers so that the scrap metal is not mixed with large plastic toys, yard trimmings, and other potential contaminants.
 - Instruct site attendants to identify appliances (e.g., refrigerators, freezers, air conditioners) that contain refrigerants including chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons. These appliances should be stored separately to avoid causing a release.
 - Prior to recycling, refrigerants must be removed from large appliances by a certified technician. Scrap metal dealers or contractors may provide this service – either independently or in association with appliance dealers. Local governments also may designate a staff person to undergo training and purchase the equipment to perform this task.

Electronics

The S.C. Manufacturer Responsibility and Consumer Convenience Information Technology Equipment Collection and Recovery Act bans specific residential electronics (e.g., computers, monitors, televisions, printers) from landfill disposal. These products cannot be placed in household trash and must be recycled.



Residents have three options to recycle unwanted electronics:

1. **Local government programs;**
2. **Manufacturer take-back programs;** and
3. **Retail outlets** (e.g., Best Buy, Staples).

SCDES offers an electronics recycling clearinghouse at des.sc.gov/e-cycle. The one-stop shop provides information for residents, local governments, manufacturers, landfill operators, retailers, and others.

REQUIREMENTS FOR LOCAL GOVERNMENTS

The legislation (Section 48-60-140) requires that electronics collected through local government programs must be recovered in a manner that complies with all applicable federal, state, and local requirements.

In addition, local governments must use a recycling vendor (recovery) that – at a minimum – complies with the Responsible Recycling (R2) or other comparable standards such as e-Stewards.

SCDES recognizes recoverers that have either R2 or e-Stewards certification. Links to processors that meet each of these sets of standards can be found at des.sc.gov/e-cycle.

ELECTRONICS COLLECTION

Most county and many municipal governments offer collection sites for unwanted electronics from residents. While the size and type vary, local governments must operate the sites in a manner that protects human health and the environment. Residents can find collection sites for electronics by county at des.sc.gov/recycleheresc.



South Carolina's electronics legislation does not address the operation of collection sites for local governments, but does require (Section 48-60-140) that recycling vendors follow the industry's best management practices for collection and storage of electronics. Given that, it is recommended that local governments follow best management practices as outlined by the Electronics Recycling Coordination Clearinghouse at ecycleclearinghouse.org.

Businesses should not throw away computers and other electronic equipment, and must follow all state and federal regulations regarding the proper management of unwanted electronics.

Chapter 5: References & Resources

- Battery Recyclers of America, Lead-Acid Battery Recycling - batteryrecyclersofamerica.com/lead-acid-battery-recycling
- E-Stewards, About the E-Stewards Standard - e-stewards.org/the-e-stewards-standard/
- E-Stewards, Find a Recycler - e-stewards.org/find-a-recycler/
- Earth 911, Appliance Recycling - earth911.com/recycling-guide/how-to-recycle-large-appliances/
- EPEAT - epeat.net
- Electronics Recycling Coalition Clearinghouse - ecycleclearinghouse.org
- S.C. Department of Environmental Services - des.sc.gov
 - E-Cycle South Carolina - des.sc.gov/e-cycle
 - Land & Waste Regulations - des.sc.gov/permits-regulations/laws-regulations-regulatory-updates/scdes-laws-and-regulations-land-waste-management
 - Used Motor Oil Recycling - des.sc.gov/community/recycling-waste-reduction/recycling-hard-manage-items/used-motor-oil-recycling
 - Waste Tires - des.sc.gov/community/recycling-waste-reduction/waste-tires
- S.C. Solid Waste Policy and Management Act of 1991 - scstatehouse.gov/code/t44c096.php
- S.C. Manufacturer Responsibility and Consumer Convenience Information Technology Equipment Collection and Recovery Act - scstatehouse.gov/code/t48c060.php
- SERI (Sustainable Electronics Recycling International), About the R2 Standard - sustainableelectronics.org/r2/
- SERI, Search for R2-Certified Electronics Recyclers - sustainableelectronics.org/find-an-r2-certified-facility/

Generally, businesses should:

- **Donate the equipment to an organization for reuse** (e.g., non-profits, schools, churches); or recycle it; and
- **Otherwise, businesses wanting to dispose of electronics must follow hazardous waste regulations** unless they prove through Knowledge of Process (KOP) or testing that the electronic equipment is not hazardous. KOP means the business has data or other information from the manufacturer that the components will not be hazardous if properly disposed. Keep all records.

PROGRAM COSTS

South Carolina's electronics recycling legislation was revised in 2022 to shift the collection of electronics from a weight-based collection system to a convenience model. Counties have the option to: 1) join the S.C. Electronics Clearinghouse (ecycleclearinghouse.org) and use manufacturer services; or 2) privately contract with a collector to pay for the recycling of electronics. The revisions to the legislation also require counties and municipalities to observe the following.

1. **A manufacturer clearinghouse's recycling program will be approved by SCDES** and must adhere to the allocation methodology which ensures larger manufacturers will provide more coverage than smaller ones.
2. **Electronic manufacturers must collect electronics** from participating counties through a recoverer.
3. **Municipalities with a population of more than 17,000 can opt to participate** if their county chooses not to.
4. **The sunset date of the revised legislation is extended** to December 2029.
5. **There are provisions to ensure collectors and recyclers are protecting human health and the environment.**

Specifics of these requirements are outlined in the legislation. Given that, it is recommended that local governments not only work closely with recycling vendors to – again – ensure that the vendor is certified (i.e., R2, e-Stewards or equivalent), but also to understand what, if any agreement the vendor has with a computer monitor or television manufacturer.

This understanding may help local governments reduce their electronics recycling costs.

Managing Miscellaneous Items



CHAPTER 6

What are miscellaneous items?

Miscellaneous items are generally defined as items that can be recycled at designated drop-off locations and/or special collection events, but not in a curbside program recycling container.

Examples are:

- **Antifreeze;**
- **Cooking oil;**
- **Fluorescent bulbs;**
- **Household hazardous waste (HHW)** (e.g., household cleaners);
- **Mattresses;**
- **Paint;**
- **Plastic film;**
- **Rechargeable batteries;** and
- **Single-use batteries.**

These items are considered municipal solid waste (MSW) and count toward the MSW recycling rate. Miscellaneous items made up about 9 percent (almost 90,416 tons) of all of the material recycled in fiscal year (FY) 2024 (July 1, 2023 to June 30, 2024).

Antifreeze

Antifreeze – which is made of ethylene glycol, water, and corrosion inhibitors – is extremely toxic. A less toxic alternative, made with propylene glycol, should be encouraged to be used. Once used, waste antifreeze may contain lead, cadmium, and chromium. Antifreeze should never be disposed of on the ground, into storm

drains, or in surface water (e.g., rivers, lakes, and ponds) because it can harm people, animals, and the environment.

Recycling antifreeze helps reduce improper disposal. It also saves money because:

- If refined on site, the county/city will reduce the quantity of antifreeze it needs to purchase;
- Disposal costs are avoided; and
- Clean-up and liability costs for improper disposal are avoided.

COLLECTION OF ANTIFREEZE

If a local government decides to collect antifreeze, the recycling coordinator must decide where (i.e., at one central location or multiple drop-off sites) and how often (i.e., as part of a monthly collection program or ongoing) it will be collected.

Antifreeze must be collected in a secure container (e.g., 55-gallon drums with lids). Collection containers should be placed on concrete pads or paved areas and protected by a cover (e.g., carport covers or other protective structures). If collected at drop-off sites, attendants should be instructed to monitor the collection containers as well as contain and clean up any spills.

Most counties that collect antifreeze use a service provider for collection. Another option is to purchase equipment to re-refine and reuse the antifreeze.

DON'T MIX IT!

Antifreeze can NOT be mixed with used motor oil or oil/gasoline mixtures. If mixed, oil and oil/gasoline vendors will not accept the material. While local governments are encouraged to establish antifreeze collection programs, antifreeze must be collected as a separate commodity.



Cooking Oil

Restaurants have long recycled their used cooking oil and grease as a way to reduce impacts on sewer systems. The recycling of used cooking oil is receiving increased attention both because of the amount being generated by residents – especially during the holiday season – and its potential to be made into an alternative fuel for vehicles.



COLLECTION OF COOKING OIL

If a local government decides to collect used cooking oil, the recycling coordinator must decide how many collection sites will be offered and whether the program will be ongoing or seasonal (e.g., November through January).

Tips for used cooking oil collection include:

- **Collect oil in a secure container** (e.g., 55-gallon drums with lids);
- **Place collection containers on concrete pads or paved areas and ensure they are protected by a cover** (e.g., carport covers or other protective structures);
- **Have attendants monitor the collection containers** as well as contain and clean up any spills; and
- **Ask residents to ensure that cooking oil is free of residue**, not mixed with other liquids, and that it is delivered to the site in a clean, non-breakable, spill-proof container.

The service provider that collects the used cooking oil may provide 55-gallon drums with lids (or a similar container) to be placed at designated recycling drop-off site(s). Some local governments provide their own collection containers. Depending on the proximity of drop-off sites to the vendor, costs may range from zero to minimal.

Fluorescent Bulbs

Fluorescent bulbs and compact fluorescent bulbs (CFLs) have been used in buildings and, less commonly, homes for many years. They last much longer than incandescent bulbs and use about one-fourth the energy, helping save money and conserve energy. They contain small amounts of mercury, however, and must be properly managed

at their end of life. Recycling coordinators can take action to both save energy and protect the environment by promoting the use of CFLs to residents as well as new recycling opportunities as they develop. Additional CFL recycling information can be found at:

- recyclinginsc.com/directory/;
- lamprecycle.org;
- almr.org;
- epa.gov/mercury/recycling-and-disposal-cfls-and-other-bulbs-contain-mercury#retailers; and
- earth911.com/recycling-guide/how-to-recycle-cfls/.

COLLECTION OF FLUORESCENT BULBS

Some local governments collect fluorescent bulbs and CFLs as part of their HHW collection programs or one-day events. Residents may be able to recycle fluorescent lighting at local home improvement stores. In general, recyclers of fluorescent bulbs provide collection boxes (usually at a cost). Recyclers may provide boxes with pre-paid postage or run collection routes to pick up filled boxes. There are several South Carolina-based recyclers of fluorescent bulbs.

For more information about recycling fluorescent bulbs, please visit des.sc.gov/community/recycling-waste-reduction/recycling-hard-manage-items.

DEFINITION

Some of the material in this chapter is considered **UNIVERSAL WASTE** if it is not collected from residents. The EPA determines universal waste to include:

- **Batteries**;
- **Pesticides**;
- **Mercury-containing equipment**; and
- **Lamps** (e.g., fluorescent, high-intensity discharge, neon, mercury vapor).

Programs that collect this material from entities other than residents must comply with Universal Waste Regulations at des.sc.gov/sites/des/files/Library/Regulations/R.61-79.273.pdf.

Mattresses & Box Springs

Managing mattresses at the end of their useful life can be challenging. While some residents will have retailers collect old mattresses when new ones are delivered (generally at an extra cost), others may choose to deliver mattresses to the landfill. Mattresses are bulky and difficult to compact, preventing landfills from achieving optimal air/space density. Some local governments, including Horry County, have shredders that allow them to either prepare materials for recycling or allow for materials to be landfilled more efficiently. This maximizes the use of available landfill space and reduces wear on compaction equipment.

Typically, recycling mattresses and box springs involves separation and baling/selling of components, such as:

- **Polyester Fabric** - Baled and recycled into rags;
- **Foam/Cotton** - Recycled into new products such as carpet padding and other textiles;
- **Wood Framing** - Chipped and used as fuel or mulch; and
- **Metal** - Sold to recyclers.

According to the Mattress Recycling Council, up to 75 percent of mattress components can be recycled. Some mattress recyclers collect material from a wide geographic range - even nationally. One challenge in recycling mattresses is that full truckloads are generally desired.

A local government can encourage their residents to have retailers take back their used mattresses, particularly if they know the store recycles the mattresses. Local governments also may consider collecting mattresses and working with other communities in order to accumulate a full truckload.

Paint

Leftover paint is frequently stored in garages and basements resulting in a collection of many different types and colors. Although latex paint is less harmful to the environment and human health than oil-based paint, all types of paint should be managed properly.

Usable latex- and oil-based paint are best handled through donation to a community

swap shop or a local organization. Otherwise, oil-based paint should be included in HHW collection.

COLLECTION OF PAINT

- **Latex Paint** - In many cases, unwanted paint can be used by another individual or organization. Some counties have permanent collection sites for latex paint and some collect it at special events for recycling. In some cases, there is only one location at which residents can drop off reusable paint. Collected paint cans should be placed on pallets, concrete pads, or paved areas and protected by a cover (e.g., carport covers, other protective structures). Paint collected by counties also may be offered to the public for reuse through swap shops at no charge. Counties report a brisk demand for usable paint. If the paint is no longer usable or there are no reuse programs in place, unwanted latex paint may be disposed of in Class 3 (MSW) landfills provided the following three steps are taken.
 1. Remove the lid and allow the paint to air dry (harden) completely. Do this in a well-ventilated area away from children and pets.
 2. Cat litter, shredded newspaper, sawdust, or sand may be added to the paint to speed the drying process, stirring occasionally.
 3. Once the paint is dried, it can be disposed of with household garbage.
- **Oil-Based Paint** - Some counties (e.g., Charleston County) accept oil-based paint from residents along with latex paint. Other counties include oil-based paint in their HHW collection program, either event or ongoing collection site.



Hazardous Household Waste

HHW are products that contain at least one hazardous substance and pose a threat to human health and the environment. These products are considered to be hazardous because they have one or more of the following characteristics:

- **Flammable** – easily set on fire;
- **Corrosive or Caustic** – causes burns;
- **Explosive or Reactive** – explodes if exposed to heat, sudden shock, or pressure; and
- **Toxic or Poisonous** – causes injury or death through ingestions, inhalation, or absorption through the skin.

Typical hazardous household products include:

- **Lawn/Garden Care Products** (e.g., fertilizers, pesticide, insecticide, fungicide, herbicide, and weed killer);
- **Paint and Paint-Related Products** (e.g., latex paint, oil-based paint, turpentine, paint stripper, rust remover, paint thinner, and varnish);
- **Automotive Fluids and Batteries** (e.g., used motor oil and filters, gasoline, diesel fuel, kerosene, auto body repair products, windshield washer solution, antifreeze, brake and transmission fluid, lead-acid batteries, metal polish);
- **Beauty Products and Medicine** (e.g., alcohol-based lotions, rubbing alcohol, medicine, nail polish and nail polish remover, hair relaxers, dyes and permanents, hair sprays, and aerosol deodorants);
- **Household Cleaners** (e.g., ammonia-based cleaners, oven and drain cleaners, floor care products, aerosol cleaners, window cleaners, furniture polish, metal polish, tub/toilet cleaners); and
- **Miscellaneous** (e.g., mercury thermometers, photographic chemicals, lighter fluid, shoe polish, fiberglass epoxy, swimming pool chemicals, mothballs, glue).

A few counties have permanent HHW collection sites. Many other counties hold single-day collection events.

To help manage these products, recycling coordinators can:

- **Provide and/or advertise collection opportunities;**
- **Offer some items (particularly low-risk items like latex paint) for reuse** in a “swap shop” or through an arrangement with schools, non-profits, or other organizations;
- **Identify organizations that will accept “leftover” or unused HHW** (some may only accept unopened products) and inform residents about what items can be collected, where to donate them, and in what condition;
- **Provide additional information** about other recycling opportunities (e.g., online tools and resources); and
- **Encourage residents to use non-hazardous alternatives** and provide them with information about such options (e.g., U.S. EPA, Environmental Working Group).



Rechargeable Batteries

All rechargeable batteries carry some level of risk if misused.

Lithium-ion batteries – the most popular rechargeable battery – have a much higher risk to human health, property, and the environment. If improperly installed, charged, stored, used, damaged, or disposed of, these batteries can catch fire and/or explode.

Rechargeable batteries should never be placed in the household garbage or recycling container. If done, these batteries can place your home and family, as well as firefighters, sanitation, and recycling workers in danger.

Rechargeable batteries should always be recycled. There are many public and private options for residents. Recycling coordinators should constantly promote these options.

Here are several recommendations that recycling programs should consider when addressing this issue:

- **Rechargeable batteries can be recycled at major retailers** (e.g., Lowe's, Best Buy, The Home Depot) that participate in the nationwide Call2Recycle program. The program is free to residents and accepts Lithium-Ion (Li-ion), Nickel Cadmium (Ni-Cd), Nickel-Metal Hydride (Ni-MH), and Nickel-Zinc (Ni-Zn) batteries as well as small lead-acid batteries.
- **Rechargeable batteries can be recycled at Batteries Plus** retail locations.
- **Redwood Materials – located in South Carolina – recycles rechargeable devices** as well as lithium-ion (Li-ion) and nickel-metal hydride (Ni-MH) batteries. Residents can drop off batteries and devices at a growing number of locations and events around the state – for details, visit redwoodmaterials.com.
- **Single-use batteries weighing up to 11 pounds** including AA, AAA, 9V, C, D, button cells, and small lead-acid batteries can be recycled through the Call2Recycle program at some participating retailers.

Local governments can use the "Take Charge: Be Battery Smart" campaign developed by SCDES in partnership with ReMA to provide comprehensive information and material on battery safety, recycling options, and more.



Common Types of Rechargeable Batteries



Lithium-Ion (Li-ion)



Lithium Polymer (LiPo)



Nickel Cadmium (Ni-Cd)



Nickel Zinc (Ni-Zn)



Nickel Metal Hydride (Ni-MH)



Small Sealed Lead Acid (Pb)

Needles, Syringes, & Sharps

Many residents have medical conditions that require injections at home. Used needles, syringes, and other sharps should never be thrown loosely in the household trash due to the risk of injury and disease transmission particularly to sanitation, landfill, and recycling workers.

SCDES recommends through its “Get the Point” program to dispose of home-generated sharps in a bleach or detergent bottle. Place a warning sticker – provided at no cost by the program – on the bottle. Once the bottle is about three quarters full, tightly secure the cap and discard the bottle in the household waste. Learn more at des.sc.gov/getthepoint.



Unwanted Medicine

Many pharmacies such as Walgreens and CVS provide drop-off boxes for unused medication. The U.S. Drug Enforcement Administration offers nationwide National Prescription Drug Take Back Days in April and October every year. In addition, many law enforcement departments in South Carolina offer take-back programs. See “Chapter 6: References & Resources, Unwanted Medicine” for more information.

Solar Panels

Many solar panels in the U.S. are coming to the end of their useful life – and it is not always clear how they should be managed. According to the U.S. EPA, crystalline-silicon solar technology represents most of the solar panel market share. These panels are constructed with an aluminum frame, glass, copper wire, polymer layers, a backsheet, silicon solar cells, and a plastic junction box. The polymer layers seal the panel from exposure to weather but can make recycling and panel disassembling difficult. Still, many of these components may be recycled. Glass comprises most of the weight of a solar panel (about 75 percent). Materials that are easily

recycled include the aluminum frame, copper wire, and plastic junction box. Other materials located within the solar cells may be more difficult to recycle, such as silver and copper. These metals, while valuable, are present in small amounts. Toxic metals – including lead and cadmium – may also be present, as well as critical materials like aluminum, tin, tellurium, and antimony as well as gallium and indium in some thin-film modules.

Preferred methods to responsibly manage end-of-life photovoltaic modules, energy storage system batteries, or the constituent materials thereof, or other equipment used in utility-scale solar projects, including:

- **Reused**, if not damaged or in need of repair, for a similar purpose;
- **Refurbished**, if not substantially damaged, and reused for a similar purpose;
- **Recycled** with recovery of materials for similar or other purposes;
- **Safely disposed of in construction and demolition or municipal solid waste landfills** for material that does not exhibit any of the

Plastic Film Recycling

Flexible plastic film is widely used in many packaging applications, including food-contact, shrink wrapping pallets, protecting dry cleaning, and as an overwrap for paper products. However, it can be challenging to collect and recycle with other typical recyclables. The plastic film is lightweight and becomes easily windblown – and the material can become entangled in recycling facility processing equipment.

Many retail stores provide collection bins for clean, dry plastic film for recycling. The plastic film is typically collected in labeled bins at the front of the store. The material is collected for recycling by a third party. Recycled plastic films become products like composite lumber products, storm water management systems, construction materials, and new flexible plastic films.

For more information about flexible plastic film recycling and to find plastic film collection points near you, as well as details about what is accepted for recycling, visit plasticfilmrecycling.org. This flexible plastic film directory is an initiative of the Plastic Industry Association.

characteristics of hazardous waste under state or federal law; or

- **Safely disposed of in accordance with state and federal requirements** governing hazardous waste for materials that exhibit any of the characteristics of hazardous waste under state or federal law.

South Carolina has developed Regulation 61-107.20, which places certain registration and decommissioning requirements on large solar energy systems – ground-mounted solar energy systems that occupy more than 13 acres. Such projects must submit a decommissioning plan, including financial assurance, to SCDES 5 years prior to its projected end of life. Additionally, the system must be decommissioned within 12 months after a 12-month period in which no electricity is generated. Some South Carolina counties have also developed their own solar panel ordinances.

SCDES's Office of Solid Waste Reduction and Recycling (Office) keeps in touch with recyclers working on developing solar panel recycling in South Carolina. S.C. homeowners seeking to dispose of solar panels can contact the Office for updates, or inquire at their local landfill to see if they are accepted for disposal. Large solar energy systems must follow the S.C. regulations described. For more information and updates, See "Chapter 6: Reference & Resources" below.

Other Items

There are countless other items not included in this list that are difficult to manage. Earth 911 and the U.S. EPA are valuable resources to share with residents. A best practice to follow is to keep a list of miscellaneous items that residents frequently ask how to manage in order to keep information on hand.

Chapter 6: References & Resources

- Association of Lighting and Mercury Recyclers - almr.org
- Battery Council International - batteryCouncil.org
- Call2Recycle, Inc. - call2recycle.org
- Earth911 - earth911.com
 - Home Battery Recycling Guide - earth911.com/home-garden/home-battery-recycling-guide/
 - Recycling Center Search - search.earth911.com
 - "How to Recycle Fluorescent Tubes" - earth911.com/recycling-guide/how-to-recycle-fluorescent-tubes/
 - "How to Recycle Paint" - earth911.com/recycling-guide/how-to-recycle-paint/
- Lamp Recycle - lamprecycle.org
- Plastic Industry Association, "Flexible Film Recycling" - plasticfilmrecycling.org
- S.C. Department of Environmental Services - des.sc.gov
 - Solar Panels - des.sc.gov/programs/bureau-land-waste-management/solar-panels
 - Solar Panels, Local Ordinances - des.sc.gov/programs/bureau-land-waste-management/solar-panels/solar-panel-ordinances
 - "Recycling Hard-to-Manage Items" - des.sc.gov/community/recycling-waste-reduction/recycling-hard-manage-items
 - Where to Recycle Locally - des.sc.gov/recycleheresc
- Mattress Recycling Council - mattressrecyclingcouncil.org
- S.C. Hazardous Waste Management Act - scstatehouse.gov/code/t44c056.php
- S.C. Recycling Market Development Program - recyclinginsc.com
 - Recycling Markets Directory - recyclinginsc.com/directory
- S.C. Solid Waste Policy and Management Act of 1991 - scstatehouse.gov/code/t44c096.php
- Solar Panels, SCDES
 - des.sc.gov/programs/bureau-land-waste-management/solar-panels
 - des.sc.gov/programs/bureau-land-waste-management/solar-panels/solar-panel-ordinances (for local ordinances)
- Solar Panels, U.S. EPA
 - epa.gov/hw/solar-panel-recycling
 - epa.gov/hw/end-life-solar-panels-regulations-and-management
- Steel Recycling Institute, Appliance Recycling - steelsustainability.org
- U.S. Environmental Protection Agency - epa.gov
 - CFL Information - epa.gov/cfl
 - Universal Waste Rule - epa.gov/hw/universal-waste
- Unwanted Medicine
 - SCDES Recycling Hard-to-Manage Items, des.sc.gov/community/recycling-waste-reduction/recycling-hard-manage-items/unwanted-medications
 - S.C. Department of Public Health, DEA National Drug Take Back Day, dph.sc.gov/professionals/healthcare-quality/drug-control-register-verify/dea-national-drug-take-back-day
 - Walgreens, Safe Medication Disposal, walgreens.com/topic/pharmacy/safe-medication-disposal.jsp
 - CVS, Unwanted Medication Drop Box Locator, cvs.com/content/safer-communities-locate

Managing Food Waste



CHAPTER 7

The State of Food Waste

Food waste is the No. 1 item thrown away in the United States. The U.S. EPA estimates that 66 million tons of food waste were generated in the United States in 2019. According to ReFED, South Carolina generated an estimated 806,000 tons of food waste in 2023. Of that amount, about 180,000 tons were recycled into compost. A study by the Natural Resources Defense Council (NRDC) reveals that at least 40 percent of all food grown and processed nationwide goes uneaten each year at a cost of more than \$382 billion annually.

On average, a family of four throws away about \$3,000 worth of food annually. Yet, in 2023, it's estimated about 47 million people were food insecure in the United States including more than 650,000 South Carolinians. This is according to Feeding America, a non-profit organization with a network of food banks that is leading the fight against hunger in communities nationwide.

Wasted food also means wasted resources. The growing, processing, packaging and transporting of food uses significant amounts of water, energy, time, money and other resources – all lost if the food is not consumed.

What is food waste?

Food waste is the portion of the organic waste stream that includes food that is discarded or uneaten. Pre-consumer food waste includes:

- **Trimming**s from fruits, vegetables, meats, etc.;
- **Incorrectly prepared or overproduced dishes** in restaurants;
- **Produce deemed “too ugly”** for retail shelves; and
- **Forgotten or over-purchased food** that spoils before it is eaten.

Post-consumer food waste is plate scrapings and leftovers. Both can be generated in all community sectors (residential, commercial and institutional) at a variety of locations including:

- **State agencies and colleges/universities**;
- **Healthcare facilities** (e.g., hospitals, nursing homes);
- **Hospitality facilities** (e.g., restaurants, lodging facilities);
- **Industrial facilities, offices and other businesses**;
- **Residential homes**; and
- **Schools and child-care facilities**.

Federal Policies on Food Waste

Governmental entities, businesses, organizations, schools and colleges/universities can donate food and are given liability protection through federal and state laws.

Tackling Food Waste

In 2016, the Office developed an outreach campaign called Don't Waste Food SC (DWFSC).



DWFSC is a collaborative partnership of public and private stakeholders working together to help South Carolina meet the U.S. EPA goal of reducing food waste by 50 percent by 2030. The campaign is designed to provide information to empower individuals, businesses, and communities to reduce food waste through prevention and donation.

The Office also promotes food waste prevention as well as recovery through its S.C. Smart Business Recycling Program and outreach efforts to schools and colleges/universities. The Office also added lessons to its K-12 curriculum (Action for a Cleaner Tomorrow) and certification programs for local government and college/university recycling professionals.

The Bill Emerson Good Samaritan Food Donation Act protects food donors from civil and criminal liability should the donated food later cause harm to its recipient. It was signed into law in 1996 and covers “apparently wholesome food” or “apparently fit grocery product” intended for human consumption that is donated in good faith to a non-profit organization for distribution to those in need. The purpose of this law was to standardize various state laws and encourage more entities to donate food, thus reducing food waste.

The School Food Recovery Act of 2020 – and H.R. 5459 introduced in the following legislative session – would have directed the U.S.

Department of Agriculture to provide competitive grants and technical assistance for local educational-focused agencies to implement food waste measurement and reporting, prevention, education and reduction projects. For details, please visit congress.gov/bill/116th-congress/house-bill/5607.

S.C. Policy Regarding Food Waste

Food waste prevention and recovery is a priority in South Carolina. Beyond the economic, environmental, and social benefits previously outlined, food waste prevention and recovery also provide South Carolina with a significant opportunity to achieve the state’s per capita waste reduction goal of 3.25 pounds or less and recycling rate goal of 50 percent of the MSW stream.

The Benefits of Reducing Food Waste

1. **Save money.** Smart purchasing and improved food prep and storage practices lead to less spending as well as lower disposal costs for both families and businesses.
2. **Feed hungry people.** Donation is a great way to keep food from the landfill and provide it to those in need.
3. **Create jobs.** Organics recovery is an emerging market in South Carolina, creating new jobs and businesses for food waste haulers, composting facilities, and others.
4. **Conserve resources.** Preventing food waste prevents wasting water, energy, and land used to make food, according to the NRDC.
5. **Help the planet.** Wasted food decomposes in landfills and produces methane which is a greenhouse gas (GHG). Reducing the amount of food going to landfills also reduces the amount of GHG emissions into the atmosphere.
6. **Feed the earth.** If it’s not possible to prevent, reduce or donate – compost. Composting can improve soil health, add structure, increase water retention, support native plants, and reduce the need for fertilizers and pesticides.

USC’s Food Recovery & Composting Programs

The University of South Carolina (USC) proactively tackles both food waste and campus food insecurity through a series of innovative programs.

USC partners with student-led networks like “Swipe Out Hunger,” converting donated meal swipes into meal plan scholarships, and “Feed the Flock,” which repackages surplus dining hall meals into grab-and-go portions for the on-campus CommUnity Shop.

USC’s “Garnet Bites” program also notifies registered students when surplus catering food is available for pick-up within a 30-minute window after events.

Altogether, these efforts have allowed the dining program (Carolina Food Company) to donate over 40,000 pounds of food in just the past three years.

When it comes to composting, the University has diverted nearly 750 tons of food waste from landfills since launching their composting program in 2017. This is achieved through collaboration with SMART Recycling and ReSoil Compost, with the resulting compost enriching gardens and farms across the Southeast.

In addition to federal legislation, South Carolina law provides liability protection for food donors through S.C. Code of Laws, Section 15-74-10 et seq. According to the law, "the donor, in good faith, of distressed food apparently fit for human consumption, to a bona fide charitable or nonprofit organization or food bank or prepared and perishable food program for free distribution, is not subject to criminal penalty or civil damages arising from the condition of the food or the nature or condition of the land entered, unless an injury is caused by gross negligence, recklessness, or intentional misconduct of the donor."

The majority of food waste would be considered a Category II organic feedstock for composting, indicating it has a high-moisture content and is likely to contain pathogens compared to Category I feedstocks (e.g., leaves, grass, woodchips).

In addition, the regulation requires that food residuals must be incorporated into the compost mass the same day of receipt or stored not more than 72 hours in closed, air-tight and leak-proof containers. More information on composting and feedstock categories can be found in Chapter 8.

Options for Managing Food Waste

The U.S. EPA's Food Recovery Hierarchy presents different options for managing food waste.



SOURCE REDUCTION

The prevention/reduction of food waste is the U.S. EPA's preferred method of managing this waste stream. Reducing food waste at the source of generation requires a change in habits and daily practices, most often accomplished through public education and outreach. The messages should be tailored for the specified audience and should include the benefits of reducing food waste.

Several source reduction recommendations include:

- **Provide tips on meal planning** (e.g., make a shopping list to avoid over-buying, inventory the pantry before shopping) and proper food storage to maximize freshness (e.g., freeze excess produce before it spoils, make soup with extra vegetables);
- **Encourage residents to buy less-than-perfect fruits and vegetables** to reduce the amount of produce thrown away by grocery

Loaves & Fishes: Making a Difference

Loaves & Fishes in Greenville, SC is an example of a successful food donation organization.



Local restaurants, grocery stores, caterers, and farmers contact the non-profit group when there is surplus food. Loaves & Fishes drivers collect the food and deliver it to people through partner agencies such as non-profits, churches, Section 8 apartment communities, and other established food relief programs. In addition, Loaves & Fishes accepts donations and coordinates canned food drives. In 2024, Loaves & Fishes rescued 2.5 million pounds of surplus food that would otherwise have gone to waste.

Visit loavesandfishesgreenville.com for more information.

stores. Misfits Market created an online marketplace – misfitsmarket.com – to reduce food waste by sourcing produce and grocery items that would otherwise go unused. Think cosmetically imperfect produce, surplus inventory, and wrongly packaged items – and delivering them directly to customers at reduced prices;

- **Encourage schools to switch to self-service.** Allowing students to choose the foods they prefer to eat is a simple way to reduce food waste; and
- **Encourage food-related venues (e.g., dining halls, cafes, restaurants, convenience stores) to conduct waste audits** to determine the types and quantities of food being wasted. Restaurants and dining halls should adjust their menus if a particular dish tends to go uneaten on a regular basis.

The avenues used to reach the targeted audience will vary. Print media, public service announcements, and electronic media are great forms of residential outreach to show the benefits of reducing food waste.

FEED HUNGRY PEOPLE

Hunger can affect anyone. Food donation programs help feed people in need, reduce the amount of food waste disposed of, and offer

tax benefits to those donating food. With the passage of the Bill Emerson Good Samaritan Food Donation Act and subsequent state legislation, donors are protected from liability as long as the donated food is intended for human consumption and has been donated in good faith.

Listed below are examples of food donation programs.

- **Food Banks** – Almost every community has a food bank or soup kitchen to help residents who do not have enough food to feed themselves or their families. Generally canned and packaged foods are accepted at food banks while prepared foods from restaurants and caterers are delivered to shelters, soup kitchens, or churches for immediate consumption via food networks. South Carolina food hubs include Second Helpings and Loaves & Fishes. Feeding the Carolinas (which includes Golden Harvest, Harvest Hope, Lowcountry and Second Harvest Food Banks) is a member of Feeding America, a nationwide network of food banks. Links to these organizations can be found in the Resources & References section of this chapter.
- **Food Drives** – Local food drives offer residents and businesses an easy way to help those in need. Many times a food drive will be

Resources for Reducing Food Waste

Don't Waste Food SC (DWFSC) is a campaign designed to increase awareness of the economic, environmental, and social impacts of wasted food and inspire actions to reduce it. "Don't Waste Food SC: A Guide for Reducing Food Waste at Home" provides tips to waste less food, help feed those in need, and save money. Learn more and download the guide at des.sc.gov/dwfsc.

In addition, DWFSC has other resources available to reduce the amount of food waste created daily, including a weekly meal planner and shopping list, "Reducing Food Waste: A Guide for K-12 Schools," and "Don't Waste Food SC Ambassador Toolkit."

Visit des.sc.gov/dwfsc for these and more information on the campaign – including how to become a DWFSC Ambassador.



paired with an event – such as a concert, a sporting event or a holiday party – in which attendees are asked to bring a non-perishable food item that will be donated to a local food bank such as Harvest Hope.

Tools for Assessing Wasted Food

The U.S. EPA offers several assessment tools for food service establishments to measure and track food waste, including:

- **Food Waste Assessment Guidebook;**
- **Toolkit for Reducing Waste Food and Packaging;**
- **Excess Food Opportunities Map;**
- **Paper Tracking Waste Logs;** and
- **The Waste Reduction Model (WARM).**

Visit epa.gov/sustainable-management-food/tools-assessing-wasted-food for resources.

- **Gleaning** – The act of collecting excess fresh foods from farms, gardens, farmers' markets, grocers and other sources is called gleaning. In South Carolina, the non-profit group Fields to Families links farmers with excess fruits and vegetables to organizations that feed the hungry in the Lowcountry. Learn more at fieldstofamilies.org.

FEED ANIMALS

Feeding food scraps to animals often provides companies a less expensive option for food waste disposal than landfilling, and the farmer who owns the animals saves money by not having to buy as much feed. Some zoos accept certain food donations, typically from food manufacturers that have excess product.

Food scraps can also be diverted to companies that produce animal or pet food. Before any food scraps are fed to animals, local and state rules and regulations must be followed.

The Federal Swine Health Protection Act of 1980 requires all food waste fed to swine to be properly treated to kill disease organisms. This means that vegetative waste may be fed to farm animals as long as it has not come into contact with animal waste.



Pictured: Clemson University operates an excellent composting site for food waste generated on campus.

In South Carolina, feeding food waste to swine is covered by S.C. Code of Laws Section 47-15-10 et seq. According to this statute, it is unlawful to feed garbage (e.g., animal wastes resulting from handling, preparation, cooking, or consumption of foods, animal carcasses, parts of animal carcasses, contents of offal, unpasteurized milk, unpasteurized milk products) to swine.

INDUSTRIAL USES

Food waste is increasingly being used to generate biofuel, bio-products and energy.

- **Anaerobic Digestion** – Anaerobic digestion is the biological breakdown of organic waste in the absence of oxygen. The anaerobic digestion process produces biogas that can be used as fuel to generate steam and electricity.
- **Fats, Oils and Grease (FOG)** – FOG is typically collected from generators (e.g., restaurants) and delivered to either a rendering plant, an anaerobic digester or to a facility to be converted to biodiesel fuel. Rendering plants convert the FOG into animal food, cosmetics, soap, and other products. FOG can also be added to anaerobic digesters to generate biogas. When FOG is converted to biodiesel fuel, it is a cleaner alternative to conventional diesel fuel.

COMPOSTING

Food waste can be combined with other plant materials such as dry leaves to decompose over time to form compost, a soil amendment.

South Carolina revised and expanded its composting regulation (R.61-107.4) in June 2014. One of the goals of the revision is to encourage the development of more large-scale composting facilities by the public and private sectors.

See Chapter 8 for more information on composting and visit des.sc.gov/compost.

LANDFILL/INCINERATION

Disposal and/or incineration should be the last resort for food waste management.

Chapter 7: References & Resources

- Feeding America – feedingamerica.org
- Fields to Families – fieldstofamilies.org
- Food Donation Connection – foodtodonate.org
- Food Recovery Network (Resources and Information About Food Donation Programs) – foodrecoverynetwork.org
- Food Rescue US – foodrescue.us
- Food Waste Reduction Alliance – foodwastealliance.org
- Loaves & Fishes – loavesandfishesgreenville.com
- Misfits Market – endfoodwaste.org
- Move for Hunger – moveforhunger.org
- Natural Resources Defense Council – nrdc.org
 - Waste Free Kitchen Handbook: A Guide to Eating Well and Saving Money by Wasting Less Food – nrdc.org/food/wastefreekitchen/
- Save the Food – savethefood.com
- S.C. Department of Environmental Services – des.sc.gov
 - Don't Waste Food SC – des.sc.gov/dwfwsc
- S.C. Farm to Institution – scfarmtoinstitution.com
 - South Carolina Produce Guide, <https://scfarmtoschool.com/palmetto-pick-of-the-month/>
- Second Helpings – secondhelpingsc.org
- S.C. Code of Laws, Liability Exemption for Donors of Food – scstatehouse.gov/code/t15c074.php
- S.C. Solid Waste Management Regulations – des.sc.gov/permits-regulations/laws-regulations-regulatory-updates/scdes-laws-and-regulations-land-waste-management
- USDA, U.S. Food Waste Challenge – usda.gov/oce/foodwaste/index.htm
- USDA and National Restaurant Association, Food Donation: A Restaurateur's Guide – infohouse.p2ric.org/ref/12/11907.pdf
- U.S. EPA, Sustainable Management of Food – epa.gov/sustainable-management-food
- Waste Free Lunches.org (Resources to Minimize Waste Including Food and Packaging Generated at School Lunches) – wastefreelunches.org
- Wasted Food (Resources to Minimize Food Waste) – wastedfood.com

Organics & Composting



CHAPTER 8

What are organics?

This loosely defined category includes material that has the ability to be composted or mulched. When organics are mentioned in this chapter, the term is in reference to yard trimmings, food waste, clean wood and compostable paper [i.e., paper that is not recyclable (e.g., tissues, napkins, paper towels or soiled, uncoated paper)]. While paper is considered organic, recycling is the preferred method for managing unsoiled paper.

The following are considered types of organics:

1. **Yard trimmings and land-clearing debris** (e.g., brush, tree limbs, stumps);
2. **Wood waste**;
3. **Agricultural waste**;
4. **Food waste** (pre- and post-consumer; see Chapter 7 for more information);
5. **Soiled papers**;
6. **Compostable food service ware** (e.g., cups, bowls, plates, take-out containers, utensils); and
7. **Bio-solids** from wastewater treatment plants.

S.C. Policy on Organics Waste Management

The S.C. Solid Waste Policy and Management Act of 1991 bans disposal of yard trimmings and land-clearing debris in a Class 3 (MSW) landfill but disposing of land-clearing debris in Class 1 (land-clearing debris, or LCD) and Class 2 (construction and demolition debris or C&D) landfills is allowed. The intent of the ban is to encourage the diversion of yard trimmings and land-clearing debris from landfill disposal and encourage environmentally beneficial uses instead. It also helps free space in more costly Class 3 landfills for material that cannot be disposed of in Class 2 landfills.

South Carolina revised and expanded regulation R.61-107.4 Solid Waste Management: Compost and Mulch Production from Land-clearing Debris, Yard Trimmings and Organic Residuals, in June 2014. One of the goals is to encourage the development of more large-scale composting facilities by the public and private sectors.

South Carolina's regulation R.61-62.2: Prohibition of Open Burning provides guidance on when it is acceptable to burn material such as land-clearing debris, yard trimmings, brush and leaves.

Current Generation & Management Practices

YARD TRIMMINGS & LAND-CLEARING DEBRIS

According to South Carolina's R.61-107.4, yard trimmings are defined as residuals consisting solely of vegetative matter resulting from maintenance or alteration of public, commercial, institutional or residential landscapes. This includes grass clippings, leaves, and discarded plants and weeds that have been source separated and diverted for recycling. Land-clearing debris in South Carolina is defined as "material generated solely from land-clearing activities including brush, limbs and stumps, but does not include solid waste from agricultural or silvicultural operations." This material is usually suitable for grinding or chipping. Wood chips can be used as boiler fuel, mulch or as a carbon source in composting operations.

OTHER WOOD WASTE

Other types of wood waste - aside from land-clearing debris and yard trimmings - include wood waste from furniture, construction and demolition (C&D) activities, trimmings from manufacturing, and wooden pallets. This wood can be considered "clean" (i.e., not painted,

National Data

Compostable material (i.e., food waste and yard trimmings) comprised nearly 34 percent of MSW in the United States according to the latest data available from the U.S. EPA. Of this amount, about 2.5 percent was food waste and about 24.5 percent was yard trimmings. See Appendix E for more information about composting.

stained or treated with other chemicals). (See Chapter 9 for more details on C&D debris.) Clean wood (e.g., clean trimmings from manufacturing, sawdust and untreated pallets) is suitable for mulch and composting. Treated/manufactured wood (e.g., painted and stained wood, particle board, medium-density fiberboard) is not suitable for mulching or composting due to the chemicals it has been treated with. Furniture or fixtures made from treated/manufactured wood can be donated to charitable organizations if still in good condition or disposed of in Class 1 (LCD) or Class 2 (C&D) landfills.

SOILED PAPERS

Used paper towels, napkins and soiled non-wax-coated paper and cardboard (e.g., paper plates, pizza boxes) generally can be incorporated into a commercial composting program. However, if this material is accepted with other recyclables, the higher-value use should be promoted.

COMPOSTABLE FOOD SERVICE WARE

Some food service ware (e.g., cups, bowls, plates, takeout containers and cutlery) are made from compostable material such as plant starches. However, some products have been problematic to processors because they do not biodegrade completely during the composting process. The American Society for Testing and Materials (ASTM) has standards for compostable plastics (ASTM D6400 and ASTM D6868). Due diligence should be taken before composting these types of products. Further, compostable food service ware can mistakenly be placed in the recyclable stream. The best use of compostable food service ware is when food waste and food service ware can all be collected together and delivered to an accepting compost facility. Events and venues can implement this practice, ensuring that only compostables are used, and all staff are properly trained.

AGRICULTURAL WASTE

In South Carolina, agricultural crop residue is considered a waste unless it is reused on the farm as a soil amendment or for erosion control. Agricultural residue may include manure, vegetative waste and animal remains. Used bedding and manure from animals is generally suitable for composting. Regulatory oversight depends on a number of factors including how the farm waste is used.

BIOSOLIDS

It is feasible to compost or land apply biosolids from wastewater treatment plants. However, local governments must secure a permit from SCDES. Biosolids composting is a complex and highly regulated process due to the presence of pathogens in the raw material.

FOOD WASTE

Food waste is another organic material that communities generate in large quantities. It is classified as **pre-consumer** (e.g., waste from commercial kitchen preparation and unserved food) or **post-consumer** (e.g., plate scrapings and leftovers that could include a combination of dairy, animal and vegetative waste). Food waste can be generated from a multitude of places.

As Chapter 7 describes, when managing food waste, focus should be placed on source reduction, prevention, beneficial use, if possible, and then composting. For more information on preventing food waste, see Chapter 7.

The Importance of Composting

Yard trimmings are banned from Class 3 (MSW) landfills, but can be disposed of in Class 1 (LCD) and Class 2 (C&D) landfills. Still, diverting this material from disposal in any type of landfill is desirable. Recycling coordinators should encourage their communities to use compost/mulch when available and provide educational resources on the benefits of composting in the community to help create demand for the material. Benefits include:

- **Avoiding landfill disposal of organics** and reducing methane generation;
- **Saving the local government and businesses money** on waste collection and disposal costs;
- **Reducing amount of irrigation needed** due to water retention in soil;
- **Avoiding burning leaves and brush**, which reduces air pollution;
- **Creating a beneficial product** that improves soil quality while reducing fertilizer and pesticide use; and
- **Reinvigorating conventional recycling programs** and awareness of waste reduction.

Table 8.1 provides an overview of organics management options for local governments.

There are many reasons why communities benefit from composting and mulching programs. No matter what level of interest and resources are available locally, recycling coordinators can increase the volume of organics diverted from landfill disposal by:

1. **Encouraging residents** to practice backyard composting and grasscycling;
2. **Encouraging schools, colleges/universities, businesses and hospitality facilities** to practice food waste reduction and composting; and
3. **Establishing composting and mulching options** for the community.

Backyard Composting & Grasscycling

Residential or backyard composting involves combining household organics like plant-based kitchen waste, which is rich in nitrogen (also called “greens”), with other plant material such as dry leaves, which are rich in carbon (also called “browns”). When combined in the correct carbon-nitrogen ration – three parts brown to one part

green – mixed and kept moist, these ingredients will decompose in time to form a dark, loamy substance that can be used as a soil amendment.

Grasscycling is the practice of leaving grass clippings on the lawn instead of collecting them for disposal. When done properly, clippings quickly decompose and return nutrients to the soil. The practice of leaving clippings on the lawn also slows water loss through evaporation which helps reduce water use and reduces the need for fertilization.

Backyard composting and grasscycling provide waste reduction benefits to residents and local governments that manage yard trimmings and organic material discarded by residents. Guidance materials are available to help recycling coordinators promote backyard composting and grasscycling to residents and communities, and composting at schools at des.sc.gov/compost.



TABLE 8.1: Organics Management Options for Local Governments				
LEVEL OF LOCAL GOVERNMENT INVOLVEMENT	ACTIVITY	RESPONSIBLE PARTY		
		MATERIAL COLLECTION	COMPOST PRODUCTION	MARKETING FINISHED PRODUCT
Minimal	Encourage residents, businesses, and others to manage their organic waste on site through waste reduction and/or composting.	Individual business, resident, school, etc.	Individual business, resident, school, etc.	Individual business, resident, school, etc.
Minimal	Direct organics generated by public and private entities to commercial businesses that produce mulch and compost.	Individual business, resident, school, etc.	Commercial composter	Commercial composter
Medium	Provide space, material (e.g. yard trimmings) or other resources to commercial businesses that produce mulch and compost.	Local government	Commercial composter	Commercial composter
Significant	Establish mulching and/or composting facilities managed by the local government.	Local government	Local government	Local government

Individuals can be encouraged to compost their food waste by:

- **Informing them of available resources;**
- **Holding annual or semi-annual compost bin sales;**
- **Regularly publicizing the benefits of composting;**
- **Hosting waste-free lunch days at schools and businesses** where all waste is reduced, recycled or composted; and
- **Teaching the community and students about composting** through presentations, events and tours of compost sites.

For more information on compost processing and management methods, see Appendix E.



The Compost Recipe

Four basic ingredients are required for backyard composting: 1) **browns**; 2) **greens**; 3) **air**; and 4) **water**. Mixing the right amounts of these ingredients will provide the composting microorganisms with enough carbon and nitrogen as well as oxygen and moisture to break down the material into finished compost. Recipes vary. A common mix is three parts browns to one part greens. Other variables in making compost include pile size, content, particle size, turning frequency, moisture and temperature. Getting the right proportions may take time and adjustments, but don't get bogged down on the recipe.

For complete composting instructions, download "Composting: Simple Steps for Starting at Home" at visit des.sc.gov/compost.

Establishing a Local Government Composting Operation

Many resources are available that provide more detailed information on how to establish a composting operation – see References and Resources at the end of this chapter for a partial list. Before embarking on such a venture, recycling coordinators should educate themselves about composting operations, identify the needs of their community and review South Carolina’s regulatory guidelines. The following four steps serve as a basis for planning and siting a large-scale composting operation.

1 Decide on a use for the end product.

As with any recycling program, consideration of markets should be the first step. Consider the following.

- **Which products will be produced** – mulch only, compost only or both?
- **Will the products be used for landscaping projects, shared with the community or sold to the public** and other users (e.g., landscape contractors)?
- **If they are to be sold, what similar products are being sold in the marketplace?** By whom? For what prices? If the local government decides to sell its compost and/or mulch, set a fair price so that private companies are not negatively impacted. Testing may be required by regulation.
- **To what extent is the demand met by the current products?** Does each supplier sell their entire inventory quickly or is there a surplus on the local market? Does pricing reflect the supply/demand situation? What seasonal changes are expected in supply and demand?

2 Quantify the amount of material available for composting.

- **Waste audits and records** can help estimate potential tonnages.
- **Consider yard trimmings available from the community** as well as material from other local governments, institutions, utility companies and private landscapers.

- **Consider potential contaminants.**
- **For site planning, tonnage figures may need to be converted** to volume in cubic yards in order to size compost piles or windrows and to calculate how much land is needed.

Generally, the following density conversion figures are used:

- **350 POUNDS** per cubic yard for leaves;
- **250 POUNDS** per cubic yard for loose brush; and
- **500 POUNDS** per cubic yard for chipped brush.

3 Determine the size and configuration of a composting site.

- **An estimate of the area needed for windrows can be made**, as a windrow’s or pile’s width should not be greater than two times its height. See Appendix E for more about windrow details.
- **Maximum height should not exceed 8 to 12 feet and the maximum width should not exceed 16 to 24 feet.** With this configuration, 1 linear foot of windrow contains about 2 cubic yards of leaves. Using the density conversion figures, the volume of mixtures of leaves and chipped brush can be calculated.
- **Windrows are usually constructed in pairs** at least 26 feet apart to allow access for vehicles including fire trucks. During the composting process, windrows shrink and at some point pairs can be easily combined into one windrow.
- **Allocate divided space on site for storage** of both raw material (which tend to be high in volume compared to weight) and finished material (which has become more dense).
- **Equipment access, security, equipment storage, utilities and access roads** must be considered in planning and sizing the site.

Regardless of whether the facility will require a permit or not, **a composting site must be designed to protect the surrounding environment.**

Environmental considerations include plans to minimize the impacts of:

- Stormwater and leachate runoff;
 - Mosquitoes, rodents, birds and other “vectors” that might transmit disease;
 - Odors;
 - Risk of fire;
 - Ejection of debris from wood-grinding equipment onto neighboring properties;
 - Mold and mildew;
 - Dust; and
 - Accumulation of excessive quantities of feedstock or finished compost.
- Is the equipment designed for the waste that will be processed at the site?
 - Will the equipment be able to withstand the corrosive and harsh environment of a composting facility?
 - Can you identify a nearby facility that is using this equipment and can you visit the facility and talk to operators about its performance?
 - Should the local government purchase or lease? If purchased, should pre-owned equipment be considered?

4 Identify and obtain cost estimates for needed equipment and labor.

- **Capital Costs** – The particular types of equipment needed for a yard trimmings composting operation will vary with each operation, but in general the site operator will need access to the following equipment:
 - Heavy-duty front-end loader with 1- and 4-cubic-yard buckets;
 - Dump truck;
 - Brush grinder (either a tub grinder or horizontal grinder);
 - Windrow turner (windrows also can be turned with the front-end loader, although it is more time consuming); and
 - Trommel or other screen.

Costs will vary depending on the capacity of the equipment. Equipment can be purchased (new or used) or leased. Any equipment considered for composting should be carefully evaluated as the composting environment is very demanding on equipment. There are several online resources for finding used equipment – some of which are listed at the end of this chapter. Some factors to consider when deciding on equipment include:

- What will be the operating and maintenance costs?
- Will the equipment, with a 5- to 8-year life span, accommodate potential growth in the amount of material to be handled?

- **Operating Costs** – The operational costs of a composting facility are difficult to estimate as they will vary with each individual community depending on the types of workers assigned, their skill levels, pay rates, and other factors. Operational and management tasks include, but are not limited to:

- Gate keeping and site logistics;
- Receiving and stockpiling raw material;
- Building, turning, watering and monitoring compost;
- Chipping and piling brush;
- Supervising the distribution and loading of finished compost and mulch;
- Maintaining equipment;
- Ordering and managing fuel and other supplies; and
- Record-keeping and reporting.

The number of operational hours required will depend on the level of activity at the compost site. Generally, the spring and fall months generate the bulk of the material. In summer, maintenance activities are at their peak. Winter is typically a slow time, but in some areas of South Carolina yard and vegetation maintenance activities take place year round.

Compost equipment can range significantly in price depending upon whether equipment is purchased new or used, the size/capacity of the equipment, horsepower of the motor and other options. In some cases it may be more cost effective to lease certain types of equipment (e.g., grinders, trommel screens) depending upon the compost operation.

Best Practices for Organics Collection

Organics may be collected curbside or accepted for processing at a drop-off site. Participation will be higher if curbside collection is offered, as some organics can be large-volume and challenging for residents to transport. However, drop-off sites may be more economically feasible.

The following are some best management practices for organics collection for curbside or drop-off sites.

CURBSIDE COLLECTION

- Organics containing food waste should be collected at least as often as trash, preferably weekly. In warmer months, food waste may need to be collected more frequently;
- Rigid containers are preferable to compostable bags because they are sturdier. However, containers should be no larger than 64 gallons because of the weight of food waste. Commercial facilities may use compactors for food waste. Compostable or paper bags are an alternative for residential yard trimmings; and
- Be clear and specific about what organic material is accepted (e.g., branch/tree limb size, or vegetative waste only). Educate residents and businesses at least on an annual basis on the types of material accepted and how it should be prepared for collection.

DROP-OFF SITE COLLECTION

- Provide containers convenient to the drop-off area for properly disposing of contaminants (e.g., plastic, metal or trash);
- Have clear, specific signs about what is accepted and how to prepare material; and
- Monitor and empty containers regularly to prevent odors and pests.

Feedstock Categories

South Carolina's compost regulation delineates three feedstock categories for composting operations: Category I, Category II, and Category III. See Table 8.3 for more information.

Uses & End Markets for Compost

Compost is traditionally used as a soil amendment for plants, trees and shrubs, but it is a valuable and diverse product that can be used in many ways.

Compost can be used in the following ways:

- **As a soil amendment** in place of chemical fertilizer. A few inches of compost tilled into the top layer of soil will provide nutrients for plants and improve soil structure. For potted plants, add one part fine compost to two parts potting soil.
- **As mulch** around plants, trees and shrubs. This is a particularly good use for coarser compost.

DEFINITION

WINDROW COMPOSTING is the production of soil amendment by piling organics into long rows of open, narrow heaps.

Based on the latest U.S. EPA data available from 2018, compostable material (i.e., food waste and yard trimmings) comprised nearly 34 percent of MSW. Of this percent, about 2.5 percent was food waste and about 24.5 percent was yard trimmings.



- **To help with erosion control** along steep slopes. Several inches of mature compost, screened to one half to three fourths of an inch and placed directly on top of the soil, can control erosion by encouraging vegetation growth. Compost, because it retains moisture, also helps protect soil from wind erosion.
- **To protect water bodies.** On steep slopes, mounds of compost at the top or bottom can be used to slow the velocity of water and provide additional protection for receiving waters.
- **To remediate polluted soils.** Compost can absorb odors and degrade petroleum products, pesticides and wood preservatives in soils. Compost also binds heavy metals, preventing them from contaminating water sources and plants.
- **To repair damaged turf grass.** When applied as a topdressing, nutrients and micro-organisms in compost stimulate turf growth and increase its resistance to common diseases.
- **Help alleviate soil compaction.** Incorporating compost and compost amended with bulking agents such as wood chips is a cost-effective way to aerate soil and thereby improve root penetration and increase drainage.

Marketing compost successfully depends on knowing the characteristics of the end product and accurately presenting its benefits to potential customers.

Customers may want to know:

- **The nutrient content, consistency, texture and contaminant levels** (e.g., plastics, glass) of the finished compost; and
- **The characteristics and capabilities of the product** (e.g., is it coarser material that would be suitable for mulching or finer, nutrient-rich material that would be better suited for top-dressing golf courses).



Potential customers and markets for compost include:

- **Farmers**, particularly organic growers, can use compost to boost soil fertility, reduce irrigation requirements, maintain organic grower status, reduce inorganic fertilizer inputs and improve soil structure;
- **Local sports venues** can use compost to improve and maintain turf grass;
- **Construction companies** (including transportation departments) use compost to control water erosion on active construction sites and to expedite the growth of grass in lawns, parks and median strips on finished sites;
- **Retail nurseries** supply compost directly to residents;
- **Golf courses** use finely screened compost to top dress fairways and greens as well as incorporate into landscaping and flowerbed plantings;
- **Retailers**, those who market their products directly to the public; and
- **Landscapers and lawn care companies** often use compost as a soil amendment as high-quality topsoil is less available than it used to be. These markets, however, demand consistent agronomic qualities.

OTHER METHODS FOR MANAGING ORGANICS

- **Donation** – Consumable food and reusable wooden products should be donated if possible. This is the highest and best use for this material. Non-perishable and unspoiled perishable food can be donated to local food banks, soup kitchens, pantries and shelters. Visit des.sc.gov/dwfsc and see Chapter 7 to learn more.
- **Wood Grinding** – Most wood waste that is recycled is chipped or ground for use as mulch, boiler fuel or a feedstock/carbon source for compost. Treated wood is never acceptable for any of these uses.
- **Rendering and Biofuel Production** – Many restaurants and large-scale institutions contract with a rendering company to recycle their fat, oil and grease. The grease is processed and turned into beneficial products (e.g., animal feed, cosmetic products). Some

renderers also sell “yellow grease,” which has been processed to biofuel manufacturers. In some locations, biofuel companies will collect used cooking grease and process it into biofuel for vehicles.

- **Anaerobic Digestion** – This is a biological process that is typically used to manage

homogenous organic waste streams such as municipal biosolids and agricultural waste. The process involves the breakdown of organic waste in the absence of oxygen, which generates biogas, which can be used as fuel to generate steam and electricity. A digestate byproduct also is produced, which can be used as a composting feedstock.

TABLE 8.2: South Carolina Composting Feedstock Categories

CATEGORY I	CATEGORY II	CATEGORY III	PROHIBITED FEEDSTOCK
High carbon-to-nitrogen ratio, low-risk of pathogens and other contaminants. This includes: • Yard trimmings, leaves and grass clippings; • Land-clearing debris; • Untreated, clean sawdust and wood chips (i.e., from untreated wood that has not been in direct contact with hazardous constituents); • Agricultural crop field residuals; and • Compostable bags (i.e., used for transporting organic waste)	Lower carbon-to-nitrogen ratio than Category I feedstocks, higher moisture content, more likely to contain pathogens than Category I, source-separated material only. This includes: • Non-meat food processing waste including marine shells and dairy processing waste; • Produce and non-meat food preparation generated by wholesale, retail or food service establishments; • Plate scrapings including cooked meats generated by food service establishments; • Manufactured compostable products and waste paper that are otherwise unsuitable for recycling; • Animal manure and material incidental to its collection; and • Residual organics from anaerobic digesters or other waste-to-energy conversion processes using Category I or Category II feedstocks.	Have the highest risk of pathogens and other contaminants of potentially allowable feedstocks. This includes: • Sewage sludge; • Industrial sludge; • Drinking water treatment sludge; • Fats, oils and grease; • Animal-derived residuals (except as listed in Category II); • Other industrially produced non-hazardous organic residuals not listed in Categories I and II; and • Other organics not considered prohibited feedstocks.	Material that cannot be used as feedstock in any type of compost operation in the state. This includes: • Friable and non-friable asbestos; • Biomedical or infectious waste; • Hazardous waste as defined by the Resource Conservation and Recovery Act; • Material for compost or mulch with polychlorinated biphenyl (PCB) concentrations greater than quantifiable detection limits; • Source, special nuclear or byproduct material as defined by the Atomic Energy Act of 1954, as amended; • Radioactive material; and • Material resulting from coal combustion.

Free Outreach Assistance & Resources

The Office offers free resources and assistance to help local governments educate residents, schools and businesses in their communities about composting, including:

- **Composting guides and quick-reference cards;**
- **Composting lessons** for schools;
- **Presentations** on backyard composting;
- **Technical assistance and site visits;** and
- **Directories of composting services and equipment.**

To learn more, visit des.sc.gov/compost.

Seal of Testing Assurance

The U.S. Composting Council (USCC) has a Seal of Testing Assurance (STA) program, a compost testing, labeling and information disclosure program. Enrolled manufacturers or marketers ("participants") regularly sample and third-party test their compost products based on production volumes or as otherwise prescribed by the STA program administrators for each facility they enroll. The USCC then certifies producers, as applicable. The certification also requires the disclosure of certain product information and regulatory compliance.



The Office's "Composting: Recycling Naturally" campaign was established to assist other organizations (e.g., schools, local governments) in creating a composting infrastructure within their communities. This includes teaching the benefits of compost, having a comprehensive backyard composting program for residents, and establishing and partnering with commercial composters.

Visit des.sc.gov/compost for more information.

Chapter 8: References & Resources

- Biocycle - biocycle.net
- Natural Resources Defense Council (NRDC), Composting 101 - nrdc.org/stories/composting-101
- Recycler's World - recycle.net
- S.C. Department of Environmental Services - des.sc.gov
 - Action for a Cleaner Tomorrow (K-12) - takeactions.org
 - Composting: Recycling Naturally - des.sc.gov/compost
 - S.C. Solid Waste Management Regulations - des.sc.gov/permits-regulations/laws-regulations-regulatory-updates/scdes-laws-and-regulations-land-waste-management
- U.S. Composting Council - compostingcouncil.org
- U.S. Department of Agriculture, Composting Information and Resources - usda.gov/about-usda/general-information/initiatives-and-highlighted-programs/peoples-garden/food-access-food-waste/composting
- U.S. EPA - epa.gov
 - Composting At Home - epa.gov/recycle/composting-home
 - Facts and Figures about Materials, Waste and Recycling - epa.gov/facts-and-figures-about-materials-waste-and-recycling

Managing C&D Debris



CHAPTER 9

Construction and demolition (C&D) debris is the waste generated from the construction, remodeling, repair, and deconstruction of homes, buildings, roads, bridges, and drainage/sewage systems. Often consisting of bulky material, C&D debris may include bricks, concrete, wood, asphalt (from shingles and roads), glass, metal, plastic, plumbing fixtures, gypsum (the main material in drywall), and roofing as well as debris associated with land clearing and natural disasters.

Other waste generated at C&D sites includes:

- **Waste from finishing processes** (e.g., caulk tubes and paint cans);
- **Insulation** – both rigid foam (i.e., polystyrene) and batts (e.g., fiberglass);
- **Cardboard**;
- **Shrink wrap and plastic strapping**;
- **Pallets**;
- **Glass**;
- **Wiring**; and
- **Worker-generated items** (e.g., beverage containers and food packaging).

C&D debris is part of TSW, not MSW. Therefore, recycling C&D debris is not part of the MSW recycling rate.

Waste reduction and proper recycling of C&D debris are important aspects of managing this material. Proper recycling of C&D debris can result in reduced disposal costs to generators, fewer environmental impacts, and positive economic impacts.

While recycling is encouraged, permitted Class 2 (C&D) and Class 1 (LCD) landfills in South Carolina accept various types of C&D debris that has not come into contact with hazardous or toxic components (e.g., petroleum products, solvents, pesticides, herbicides, preservatives, polychlorinated biphenyls – PCBs). C&D debris may also be disposed of in Class 3 (MSW) landfills.

C&D debris may be less costly to dispose of in Class 2 (C&D) landfills in South Carolina, than Class 3 (MSW) landfills. These cost savings, however, may be offset by other market factors.



Focusing on C&D Debris

Although diverting C&D debris does not count towards the state's MSW diversion or per-capita disposal goals, there are several reasons to focus on C&D debris. C&D debris:

- **Presents a significant diversion opportunity.** Although C&D activities vary considerably with economic conditions, C&D debris is generally a significant portion of waste generated and the majority of C&D debris can be recycled or reused;
- **Reduces waste management costs.** In many cases recycling and reusing material generated from C&D activities may reduce hauling and disposal costs;
- **Saves natural resources and reduces greenhouse gas emissions.** As with other recyclables, the recycling (and source reduction) of C&D debris results in a reduced need for harvesting or mining natural resources;
- **Can be practical.** Since C&D is non-putrescible and generally consists of dry waste, it can be practical to sort and store on site. Depending on the project, specific

material types are often generated during a particular phase of a project and are not difficult to segregate. This is especially the case with construction projects;

- **Can be a visible commitment to sustainability.** When local government implement source reduction and recycling activities at public C&D project sites, they send a positive, often highly visible message to the community that they are committed to sustainability (the same is true of private developers, who often have company signs posted at their job sites); and
- **Recycling counts towards the TSW recycling rate** which provides a broader, more realistic picture of the recycling in the state.

Going Local

Local governments often have the ability to encourage the diversion of C&D material because they:

- **Issue building permits and certifications of occupancy;**
- **Often oversee waste reduction and recycling programs;**

C&D Debris Source Reduction

There are many opportunities for on-site source reduction of C&D debris. Recycling coordinators can encourage private and public project managers to adopt these strategies. In addition, there are often local opportunities for reuse of material.

- **Use standard lumber sizes** to minimize cut-off waste.
- **Use prefabricated or modular wall sections and trusses** to reduce waste generated on site.
- **Measure carefully** to avoid waste.
- **Consider using steel framing members.** Steel is recyclable, stronger, and reduces construction time and costs.
- **Consider exposing structural elements** to use (and waste) less material.
- **Use a computer-assisted design program** to optimize plywood and drywall use.
- **Buy standard material that can be used on other projects** if purchased in excess.
- **Purchase from suppliers** that allow buying only the quantity needed.
- **Ensure that project bids require on-site separation of material** and stipulate what material or portion must be recycled. Request documentation.
- **Consider listing excess material** on websites and waste exchanges.
- **Consider donating material** to Habitat for Humanity's ReStores for reuse in other projects. ReStores accept lumber, windows, cabinets, flooring, shingles and other building supplies.

- **May have the ability to provide technical assistance;** and
- **May permit or license** processing facilities.

Markets for C&D material are typically local or regional in nature. This means the proper recycling of C&D debris can stimulate the local economy. In addition, recycling professionals can discourage disposal and encourage the waste reduction and recycling of C&D material by:

- **Promoting C&D waste reduction strategies and providing resources** so they can be easily implemented;
- **Providing information about C&D debris recycling and reuse** to related organizations, businesses, builders and contractors;
- **Developing or providing “tool kits”** (e.g., material calculators, case studies, best management practices) and training to help project managers set up successful recycling programs and minimize waste;
- **Helping project managers determine the proper size of recycling containers;**

Habitat for Humanity ReStores

Habitat for Humanity International is a non-profit housing ministry dedicated to providing shelter for homeless and poverty-stricken people around the world.

Local chapters often operate Habitat for Humanity ReStores — retail outlets where quality used and surplus building material is sold at a fraction of the normal price. Proceeds from sales help local chapters fund the construction of Habitat houses in the community.

Material sold at ReStores is usually donated by building supply stores, contractors, demolition crews, or individuals. ReStores also help the environment by providing unwanted material to those who can use it.

Visit [habitat.org/restores](https://www.habitat.org/restores) for more details.



- **Encouraging the local government to adopt policies** that support C&D debris recycling; and
- **Monitoring local C&D debris recycling initiatives** by collecting data on recycled materials and recognizing local builders/contractors who routinely properly recycle C&D debris.

Targeting C&D Debris for Recycling

Material to target at a job site includes material that is:

- **Available in relatively large quantities;**
- **Easy to separate, store and protect;**
- **Easy to market locally;** and
- **Problematic to dispose of.**

Generally wood scraps, drywall, metal, some plastic and cardboard boxes can be recovered from job sites for recycling.

Recovering C&D Debris for Recycling

Depending on available markets, material may be segregated into different containers for pick-up by different vendors or may be commingled and picked up by one vendor who sorts and markets the individual commodities.

Increased market value for segregated material may result in more revenue enough – to offset some or all of these costs – although separating material at the job site may be more time consuming and costly than combining material in one container, and can require more space. Commingling material is more likely to lead to accidental or “drive-by” contamination, which may result in the material having reduced or no market value.

As in other settings, the recycling of C&D debris can lower the cost of solid waste disposal by reducing the number and/or size of trash dumpsters and the frequency of pick-up needed. It is important that all containers be labeled clearly, using alternative languages if needed.

The continuous training of crews may be needed, especially as different contractors begin work at the project site.

Outlets for C&D Debris

C&D end markets vary based on the type and quality of material as well as regional markets. Generally, the following types of material are marketable:

- **Concrete, brick, asphalt, and other aggregates** can be used on site or locally for:
 1. Base or fill material;
 2. Paving applications and cement production; or
 3. Road construction or maintenance projects;
- **Wood** may be accepted by mulching operations, composting operations, pallet recyclers, wood pellet producers, pulp mills, and as fuel for energy generation. Painted and treated wood may not be accepted by recyclers and is not suitable for use as a fuel or for composting or mulching;
- **Metal** (e.g., pipes, aluminum doors, window frames) may be accepted by local metal recyclers and are usually of relatively high value (especially steel, copper and aluminum);
- **Dirt and sand** can be used on site or at local construction projects;

CARE for Carpet

The Carpet America Recovery Effort (CARE) is a joint industry-government effort designed to develop market-based solutions for the recycling and reuse of post-consumer carpet and encourage design for recyclability. Since CARE's inception in 2002, more than 5 billion pounds of carpet have been diverted from the nation's landfills. CARE is funded on a voluntary basis by companies in the carpet industry.

CARE provides industry information regarding end uses for carpet, diversion and recycling rates of carpet and total tons of carpet recycled annually in CARE states. CARE's website provides information about their partner recyclers by geographic location, as well as products that can minimize waste.

Visit carpetrecovery.org for more. To find carpet reclaimers near you, visit carpetrecovery.org/recovery-effort/collector-finder-map/.

- **Clean gypsum board** can be used as on-site soil amendment, soil conditioner for agricultural applications, and by drywall or Portland cement manufacturers; and
- **Asphalt shingles** often can be ground and used as feedstock for asphalt road construction. Shingles are particularly efficient to recycle because they are often the only material generated (e.g., from a roofing project). In most cases, asbestos testing may need to be done prior to recycling.

Challenging C&D Material

Some material is challenging for residents and builders to find markets for or may elicit questions. Such materials include carpet, carpet padding, and ceiling tiles.

CARPET

It is estimated that more than 4 billion pounds of carpet are disposed of nationwide every year. Carpet is a challenging material to manage in the sense that it is voluminous, taking considerable space in dumpster and landfills. In addition, not all carpet fiber types are recyclable and fiber types cannot be readily identified visually.

Therefore, it is challenging to separate recyclable carpet from non-recyclable carpet. Carpet should also be checked for asbestos and other contaminants. Generally carpet is not accepted for reuse.

C&D Debris: Disposal Don'ts

- **C&D debris** that has come in contact with or includes petroleum products, PCBs, solvents, pesticides, herbicides or preservatives **IS NOT ACCEPTED** for disposal in C&D landfills.
- **Open dumping** of C&D debris at a construction site or any other site **IS NOT PERMITTED** by SCDDES.
- **Open burning** of waste from C&D activity **IS PROHIBITED** from all commercial sites.



HOW TO REDUCE SCRAP CARPET

Recycling coordinators can encourage residents, retailers, installers, and developers to consider the following in order to reduce the amount of waste carpet generated:

- **Use more durable flooring material** instead of carpeting;
- **Select durable types of carpet**, such as low-pile, nylon and carpet with high-fiber density;
- **Install high-quality padding** to increase the useful life of carpet;
- **Use carpet tiles**, where possible, to allow for replacement of only soiled or damaged sections of carpet as needed. Some manufacturers of carpet tiles have a mail-back recycling program;
- **Use removable, washable rugs** where possible;
- **Maintain carpet** by vacuuming frequently, cleaning stains as soon as possible according to manufacturer directions and using mats in high-traffic areas;
- **Lease carpet** when possible. Some manufacturers and installers offer carpet leases that include maintenance, removal and recycling of carpet over its useful life;
- **Purchase refurbished carpet** that has been reclaimed from other businesses and institutions, cleaned and/or restored. Reconditioned carpet - sometimes referred to as "repurposed" - also may be available from independent carpet vendors;
- **Purchase carpets that are made of recyclable fiber**; and
- **Insist that old carpet is recycled**. Some installers provide this service and will document that the carpet was recycled.

TABLE 9.1: C&D Debris Generation Activities

	DEMOLITION/ DECONSTRUCTION	NEW CONSTRUCTION	RENOVATION
Description	• Often occurs in older buildings. • Material may no longer be used or may be hazardous.	• Extra material and cut ends	• Mixture of old and new material • Diverse material • Challenging to identify
Material	• Doors • Windows • Painted wood • Pipes/metals • Ceiling tiles • Insulation	• Wood • Drywall • Plastic • Cardboard	• Wood (clean/painted/stained) • Drywall • Plastic • Asphalt shingles • Windows • Pipes/metals • Insulation • Ceiling tiles
Challenges to Recycling	• May include hazardous material (e.g., asbestos, lead paint) • Deconstruction is relatively costly.	• Small quantities per site	• Diverse material stream • May include hazardous material (e.g., asbestos, lead paint)
Opportunities	• Some material (e.g., barn board, doors) can be reused. Often older material has higher value.	• Material is often generated at one phase of project. • Material is clean (e.g., unpainted wood).	• Some material (e.g., barn board, doors) can be reused. Often older material has higher value.

Encourage project managers to ask carpet vendors if they recycle carpet and padding at the end of its useful life when selecting products. Project managers of large projects also can require that old carpet be recycled at the end of its useful life when submitting a requisition or Request for Proposal (RFP).

DEFINITION

ASBESTOS is the common name for a group of naturally occurring minerals made up of long, thin fibers. Asbestos is very strong and resistant to stress or forces that might tear it apart. It also is heat resistant and used in fire-resistant products. Asbestos fibers can be toxic to humans if inhaled. Material that includes asbestos must never be burned.

Despite this, asbestos can still be found in a number of building products including:

- **Heating system insulation;**
- **Spray-applied insulation;**
- **Asphalt shingles;**
- **Vinyl floor tiles;**
- **Vinyl sheet flooring;**
- **Ceiling tiles;**
- **Roofing paper and shingles;**
- **Cement siding shingles;**
- **Plaster and joint compound;** and
- **Carpet.**

S.C. Regulation 61-86.1, Standards of Performance for Asbestos Projects, requires that prior to any demolition or renovation at a regulated facility, a thorough inspection must be done to detect any asbestos-containing material. The inspection must be done by a person licensed by SCDES's Asbestos Section as an asbestos building inspector. If asbestos is found in an area that will be disturbed during renovation or repair work, it must be removed properly and disposed of at an approved landfill.

For more information, call (803) 898-4289 or visit des.sc.gov/programs/bureau-air-quality/asbestos/renovations-and-demolitions.

CARPET PADDING

There is a nationwide infrastructure to recycle scrap carpet padding, most of which is foam, although some is rubber. Jute and other fibers also are used in manufacturing carpet padding but are generally not recyclable. Carpet padding is collected, cleaned, and combined with post-industrial foam scrap and other scrap foam and remanufactured into rebond (a type of carpet padding). Like carpet, padding is voluminous and therefore can be challenging to manage. Although it tends to be less dense than carpet, disposal of carpet padding can still be costly and may require several trips to the landfill.

CEILING TILES

Ceiling tiles can be made of many different types of material – including asbestos. Asbestos ceiling tiles are not recyclable and need to be handled with special care. SCDES's Bureau of Air Quality regulates the management of material containing asbestos. Most types of ceiling tiles found in buildings today can be recycled, but need to be properly prepared (palletized). Often minimum loads are required for pick-up. Typically this is five pallets or 30,000 square feet. There are several manufacturers of ceiling tiles that offer recyclable tiles as well as programs to recover them. They generally target commercial ceiling products.

- **Armstrong World Industries** recycles certain ceiling products – including CertainTeed, USG, and other mineral fiber ceilings in addition to Armstrong ceiling material. Since 1999, Armstrong has reclaimed over 200 million square feet of old ceilings. The recovered material is used to manufacture new ceiling products. Visit armstrongceilings.com/commercial/en/performance/sustainable-building-design/ceiling-recycling-program for more information.
- USG Corporation has a recycling program for eligible ceiling products. Visit usg.com/content/usgcom/en/sustainability/ceilings-recycling-program for more information.
- CertainTeed Corporation offers a recycling program for old ceiling tiles. Please visit designerpages.s3.amazonaws.com/assets/79724635/recyclingprogramsproductoutlineus2305.pdf to learn more.

In general, in order for ceiling tiles to be accepted for recycling they must be pre-approved through a sampling process. The tile manufacturer/recycler may require an asbestos survey for a building.

Encouraging C&D Recycling

C&D MATERIAL MANAGEMENT PLAN

Many local governments require developers to create a material management or a recycling plan for their projects – sometimes depending on the size or value of the project(s). This process, at the very least, makes the developer aware of what material can be recycled in the region.

In the management plan, local governments may require the following information:

- **Where all material will be delivered** and the tonnage recycled or disposed of;
- **Who is hauling the material** from the site; and
- **Why the material disposed of** was not recycled.

Some local governments also require weight tickets from receiving facilities and cost data.

Other policies local governments have implemented to encourage C&D recycling include:

- **Requiring public projects to achieve certain established C&D recycling goals** and/or green building standards (which include C&D recycling strategies);
- **Requiring that certain material types generated on job sites be recycled** (e.g., wooden pallets and cardboard);

- **Banning certain material types** (such as large quantities of cardboard or clean wood) from disposal at the landfill if the local government owns a landfill;
- **Requiring pre-processing of material generated** (or of projects of a certain size or dollar value); and
- **Requiring deconstruction of demolition projects** that meet certain criteria.

INCENTIVES

Local governments can incentivize recycling a high portion of material by providing:

- **“Fast track” permitting** for projects that recycle a certain percentage (expediency is important to builders);
- **Grants** to help fund C&D debris recovery (or offset the costs of renting additional containers);
- **Ordinance relief** to allow recycling containers to encroach onto sidewalks, or other areas, if needed;
- **A financial “rebate”** (e.g., from a deposit paid when applying for a permit) for projects that recycle a certain percentage. This can be on a sliding scale that increases to 100 percent as the recycling goal is reached.

Recycling Cardboard from Construction Sites

In cases where local government resources are not available to implement full-scale C&D debris recycling programs, coordinators can promote cardboard recycling at construction sites. Many products come in cardboard boxes including light fixtures, cabinets, appliances and flooring.

Recycling coordinators can help builders place appropriate containers for cardboard collection, train their staff to source separate material, and arrange to have the material collected or collect it themselves. Even communities without a material recovery facility usually have markets for cardboard. Any revenue generated could be used to offset collection costs.



Green Building Requirements

LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) PROGRAM

The U.S. Green Building Council has developed the LEED program, which has become a popular standard for incorporating sustainable practices in construction and deconstruction projects.

LEED currently has five rating systems:

1. **Building Design and Construction** (BD+C);
2. **Interior Design and Construction** (ID+C);
3. **Building Operations and Maintenance** (O+M);
4. **Neighborhood Development** (ND); and
5. **Residential Design and Construction**
6. **City/Community Development**

LEED is a point-based certification program that quantifies how well buildings perform at saving energy, reducing carbon dioxide emissions, reducing water use, fostering a clean environment, encouraging the use of alternative transportation (including property enhancements to promote recycling), and more criteria. The highest ranking is platinum, followed by gold, silver, then LEED-certified.

GREEN GLOBES

Another program called Green Globes encourages green design and maintenance. Green Globes has certification programs for new buildings or significant renovations of existing buildings as well as for operations and maintenance of existing buildings and for interior design.

By law, all state-owned and state-funded construction projects in the state greater than 10,000 square feet and any major renovation projects of greater than 50 percent of total building space or value must achieve at least LEED Silver certification, Green Globes two-globes standard, or comparable standard.



C&D Material Markets

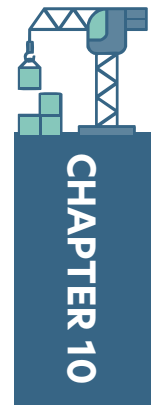
The South Carolina Recycling Markets Directory is a great resource for finding outlets for all types of materials – including Construction and Demolition. Within the C&D category, users can select a broad array of material types including carpet, concrete and brick, railroad ties, scrap lumber, roofing material, asphalt pavement, and more.

Visit recyclinginsc.com/directory/ for more information.

Chapter 9: References & Resources

- Building Materials Reuse Association – buildreuse.org
- CalRecycle Model C&D Ordinance and Information – calrecycle.ca.gov/lgcentral/library/canddmodel/
- Carpet America Recovery Effort (CARE) – carpetrecovery.org
- Carpet America Recovery Effort (CARE), Collector Finder Map – carpetrecovery.org/recovery-effort/collector-finder-map/
- Construction & Demolition Recycling Association (CDRA) – cdrecycling.org
- Construction & Demolition Recycling Association (CDRA), Find A Recycler – cdrecycling.org/find-a-recycler/
- Green Citizen, Green Directory – directory.greencitizen.com/green-directory/
- Green Globes (Green Building Rating System) – thebgi.org
- Habitat for Humanity ReStores – habitat.org/restores
- S.C. Department of Environmental Services (SCDES), Asbestos Information – des.sc.gov/programs/bureau-air-quality/asbestos/renovations-and-demolitions
 - SCDES, S.C. Solid Waste Processors/Construction & Demolition Debris Recyclers – des.sc.gov/sites/des/files/Documents/BLWM/Recycling/OR-2263.pdf
- S.C. Recycling Markets Directory – recyclinginsc.com/directory
- S.C. Solid Waste Processors/ Construction & Demolition Debris Recyclers – des.sc.gov/sites/des/files/Documents/BLWM/Recycling/OR-2263.pdf
- U.S. Green Building Council – usgbc.org
 - LEED – new.usgbc.org/leed
 - South Carolina Chapter, usgbc.org/usgbc-south-carolina

Material Processing



Material processing is the step where collected recyclables are sorted by commodity, cleaned of contaminants, and prepared for delivery to another facility for additional processing or directly to a manufacturer.

Processing is a critical step. Without effective processing, recyclables cannot be turned into raw material for new products – which undermines the overall recycling system.

In South Carolina, the majority of recyclables are processed at one of the 10 material recovery facilities (MRFs) throughout the state. See page 11 for a map of S.C. MRF locations.

Processing options for recyclables include:

- **Sending recyclables to an existing processing facility** (publicly or privately owned) for processing;
- **Building or upgrading a publicly owned processing facility**, which could be owned by a local government or a group of local governments; and
- **Negotiating with a private processor to construct or upgrade a facility** (which typically requires a long-term contract and a significant quantity of recovered material).

In recent years, MRFs have relied heavily on costly automated processing, resulting in larger regionalized facilities that are more cost effective. Unless a community is very large or has its own processing facility, its program will likely be served by an existing MRF in the region – which will dictate the degree of separation and material that can be accepted. Whichever processing arrangement is made, it needs to be integrated with the entire solid waste management system.

Processing, Collecting & Marketing

In general, processing arrangements should maximize the marketability of the material collected. This goal may not be possible for every material (e.g., plastic resins collected in lower quantities may need to be sold in a “mixed” bale).

Finding the highest value markets for the higher volume and/or higher value material will ensure that the net cost per ton for processing material is

as low as possible, making recycling as cost effective as possible for the community. This is particularly true if the community receives a revenue share for their recovered material or sells it directly. In some cases, communities issue bids for recyclables processing (often as part of the collection contract) with the focus on cost and the community’s service needs.

To decide on the optimal processing and marketing arrangements for collected recyclables, the community’s unique needs and circumstances need to be considered such as:

- **The quantity and types of material to be processed** and where the material will be generated;
- **Existing processing facilities’ characteristics:**
 - Age and capacity;
 - How material is processed;
 - Material currently accepted and how it’s accepted (e.g., dual stream, single stream); and
 - Are the MRFs in the region meeting the needs of other nearby communities?
- **Whether nearby communities are considering implementing new programs** or changing their collection programs; and
- **Whether the local government has the staff and other resources to establish its own processing facility**, possibly to share or regionalize with neighboring local governments.

Processing is linked not only with marketing, but also with the collection method(s) chosen by the community and/or the hauler. The relationship between the three is a dynamic balancing act. For example, selecting a specific collection method (or even container type) has an impact on the way recyclables can be processed. Likewise, the quality of the processed material directly impacts the ability of the MRF to market the material.

From another perspective, if end markets demand extra-clean material, the type of processing (and therefore collection method) that will work in a particular program may be based on a curbside-sort collection system or the MRF may require additional investment to improve sorting technology.

All stakeholders wish to ensure that the recyclables collected are marketable – and this is vital to the continued success of recycling. Therefore, it is important that all stakeholders communicate effectively with each other. Figure 10.1 provides an illustration of how material collection, processing, and marketing all impact each other.

Processing Options

There are two basic types of MRFs based on the type of collection program that delivers the material.

1. **Single Stream** – Material is delivered to the MRF in one stream – fiber and containers mixed together. Single-stream facilities usually separate fiber from commingled containers early in the sort process. From there, the dual streams move to separate sort lines. Single-stream MRFs are usually larger, regionalized facilities.

2. **Dual Stream** – Material is delivered to the MRF in two streams – fiber and commingled containers (e.g., aluminum cans, plastic bottles, glass jars). Typically, there are two separate tipping areas and incoming material storage bunkers to keep these streams separate. Usually each stream is sorted separately on its own sort line, but some dual-stream MRFs “batch process” using the same sort line for both streams. The level of mechanized sorting, processing capacity, and cost of processing can vary considerably among dual-stream MRFs.

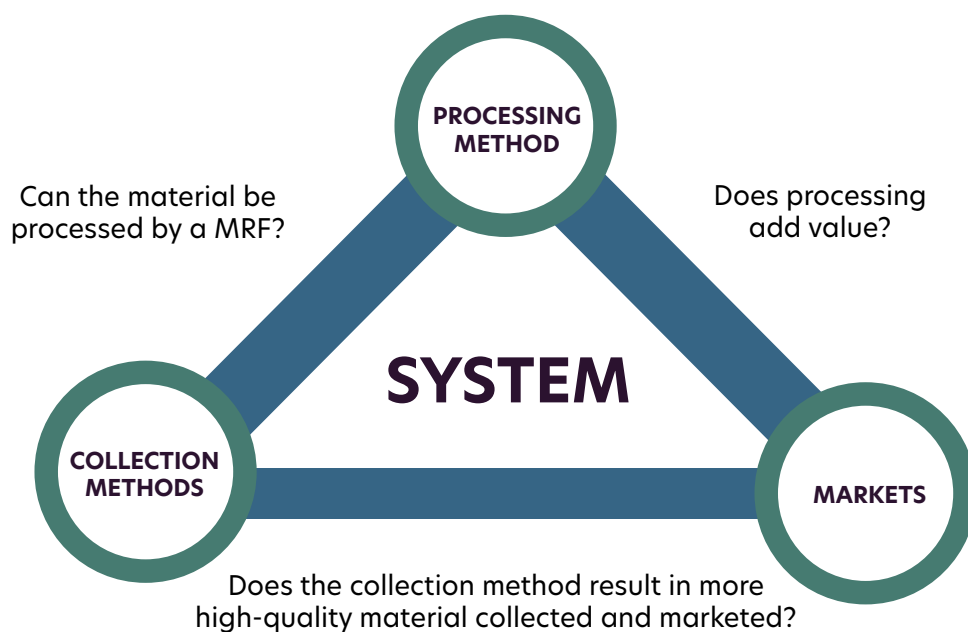
SINGLE STREAM: PROS & CONS

Single-stream programs have become more common than dual-stream programs, largely driven by the reduced collection costs associated with single-stream, cart-based collection systems. There are both pros and cons to single-stream programs.

On the positive side, single-stream programs have the potential to:

- **Increase participation** due to the simplicity of commingling material;
- **Increase the quantity of material collected per household** when carts are used, due to increased capacity;

FIGURE 10.1: The Collecting/Processing Method



- **Reduce collection costs** with no curbside sorting and automated collection with only one person on the truck; and
- **Protect recovered material from the elements**, potentially enhancing their marketability and reducing litter.

Some of the concerns with single-stream programs include that they can:

- **Deliver an increased amount of unwanted material (contamination) that must be discarded at a cost** (that may be passed to the local government);
- **Increase processing costs**, due to the increased level of mechanization at the MRF; and
- **Increase contamination levels in marketed bales** due to compaction in collection vehicles and the inability of sorting equipment to separate material perfectly. This can reduce the value of material.

DUAL STREAM: PROS & CONS

Some of the benefits of dual-stream recycling include:

- **Less Contamination:** There is a significant reduction;
- **Higher Quality Material:** Less contamination results in cleaner material, increased market access, and higher commodity prices; and
- **Lower Processing Costs:** Requires less equipment making it less costly than single-stream processing.

Some of the drawbacks of dual-stream processing systems include:

- **Higher Collection Costs:** Dual-stream recycling requires multiple bins and increased use of and/or purchase of additional collection trucks for different material streams as well as longer collection time;
- **Less Convenience:** When residents and workers have to separate their recyclables into separate streams, they may be less likely to participate due to confusion, unwillingness to separate the material and/or space constraints.

The technology for single-stream collection of recyclables evolved more quickly than the

technology for single-stream processing of recyclables. Some stakeholders, eager to implement single-stream to reduce collection costs, have attempted to retrofit MRFs or add sorters without the specialized equipment needed and have experienced imperfect outcomes.

Sorting equipment technology is continually evolving. Disc and star screens, which sort paper into various grades and allow containers to fall through, are becoming more sophisticated. Automated optical sorting systems are now relatively common. They utilize machine learning and artificial intelligence to better identify and separate recyclable materials.

Robots are also being used, in combination with vision scanning systems and artificial intelligence, to sort recyclables. Robots can perform 80 to 100 picks per minute with a high degree of precision, compared with 20 to 50 for a human sorter.

This new technology is usually used in combination with more traditional equipment such as eddy current separators (to sort aluminum), air classifiers (to separate lighter material from heavier), and magnetic belts (to sort steel), along with people. Some MRFs also have vacuum systems to remove film plastic from the material stream.

Not only will the improvements in technology continue to ensure that commodities are clean, but they also will reduce the number of laborers needed at the MRF - which is usually the highest operating cost. Human sorters also perform with less consistency and can be challenging to hire. Data systems in MRFs also help MRF managers better understand contamination and document bale composition, confirming that mill specifications are being achieved.

End markets have made progress in adapting their manufacturing equipment to be more accommodating of material from single-stream processors. Optical equipment is being used at some glass processing facilities, for example, to screen ceramics from the incoming material stream.

As sorting technologies have improved, paper mills have become more willing to accept mixed paper bales. Many paper mills also have improved technology to remove contaminants in the pulping process. As paper declines in use, mills have had to adapt their processing to the material that is available.

TABLE 10.2: Summary of MRF Ownership and Operation Options

OWNERSHIP OPTIONS	OPERATING OPTIONS	STRENGTHS	WEAKNESSES	CAPITAL COST IMPLICATIONS
Private	Private	- Often experienced in designing, building, and operating MRFs – usually ample expertise exists and the local government need not become too involved - Likely to have strong relationships with end markets	- Local government may have limited or no control over material accepted and how it is processed - Obtaining reliable data in a usable format may be more challenging than with publicly owned/operated MRFs - Public entity will need to negotiate to receive revenue from material sale - Operator may restrict use of facility to its own hauling company, limiting local government collection options	No capital required from local government
Private	Non-Profit or Combination of Private/ Non-Profit	- MRF may provide services beyond processing (e.g., training/employment for individuals with special needs) - A private owner/operator will have design, construction, and operational expertise – limiting need for local government involvement. - Operating costs can be reduced by using non-profit employees - Grants may be available to support the training mission	- Local government may have limited or no control over material accepted and how it is processed - Obtaining reliable data in a usable format may be more challenging than with publicly owned/operated MRFs - Facilities with non-profit employees may not operate as efficiently as those operated by other employees - Use of non-profit employees may require additional management hours and/or transportation of employees - Public entity will need to negotiate to receive revenue from material sale	No capital required from local government
Public	Public	- Has complete control of facility – can design to suit needs and change program if/when desired - Public entity retains all revenue from material sales	- May not have expertise in facility design, construction, and operation - May not have sufficient qualified staff to manage and operate a facility - Assumes financial risk	Requires capital resources from public entity
Public	Private	- Public entity has more control of facility than if privately owned - Private entity may still lend expertise for design/construction and will have operational expertise - Public entity may be able to negotiate more revenue share, as it owns facility	Public entity assumes financial risk – particularly if there is some concern that facility will be underutilized	Requires capital resources from public entity
Public	Public/ Non-Profit	- Public entity has complete control of facility – can design to suit needs and change program if/when desired. - Public entity retains revenue from material sales - Additional services are provided, such as training - Grants may be available to support the training mission	- Public entity may not have expertise in facility design, construction, and operation - Public entity assumes financial risk - Facilities with non-profit employees may not operate as efficiently as a facility operated by other employees - Use of non-profit employees may require additional management hours and/or transportation of employees	Requires capital resources from public entity

REGIONALIZATION: PROS & CONS

The Act strongly encourages regionalization. Both the Act and the S.C. Solid Waste Management Plan recognize that smaller local governments benefit from working together.

In a regional approach to planning and implementing recycling programs, participating local governments can work together to make the most efficient use of limited personnel and equipment resources. This results in improved economies of scale and market leverage when contracting together for services and when marketing recyclables.

Regional processing leads to aggregation of recycling tonnage and results in higher output, thereby lowering per-ton operating costs for all participating communities. Regional processing

also allows participating local governments to establish a common list of targeted materials and similar collection systems so there is consistency in programs, which facilitates public understanding of what and how to recycle. Local governments not only can partner with other local governments, but also with colleges and universities and private companies to establish processing infrastructure. For example, an industry that generates plastic scrap from manufacturing may be willing to assist local governments with processing equipment (e.g., donating a used baler) if the local government will store and ship the material rather than the industry incurring costs for storage and shipping themselves.

As is described previously, single-stream processing is leading to greater regionalization

Facility Location & Design

There are many ways to design a facility, but some basic best management practices should be followed. The practices outlined below can be used to guide the design of a public MRF or to evaluate the suitability of a private facility that may be offering its services.

- **The facility should be located close to population centers and collection sources;**
- **The facility should be located close to major highways** or other transportation arteries (e.g., a railroad) and have easy access;
- **Traffic flow should be designed such that personal vehicles are kept separate from delivery and pick-up traffic** to enhance safety and efficiency;
- **The site should have adequate space** to accommodate the structure, outside storage, vehicular traffic, buffer areas, and potential expansion;
- **Adequate utilities** (e.g., water, electricity, sewer, telephone) must be available. Sometimes heavy-duty electrical service is needed;
- **The facility should be located in a suitable area** from a zoning perspective – typically warehouse/industrial zoning;
- **The processing layout should be logical and adequate** to meet the needs of the anticipated material volume as well as planning for potential program expansion. In existing facilities, large piles of material that have obviously been stored for a length of time indicate issues with storage and/or material flow;
- **The facility should have adequate ventilation, heating and air conditioning, lighting, and be secured;**
- **The facility should have adequate overhead clearance** to accommodate vehicles' tipping material and sufficient loading dock space;
- **The facility should have scales;**
- **The facility should have enough indoor space** to store a minimum of two days' worth of incoming material at peak times. In existing facilities, piles of material stored outdoors in the weather should prompt questions to the MRF manager as to why this is allowed due to the impacts of moisture and sunlight on material quality and the potential for material to become windblown;
- **The facility should have the appropriate number of incoming storage bunkers** and sorted material storage areas. Extras may be allowed for program expansion or a flexible design might be incorporated; and
- **Processed inventory that is awaiting shipment should have a separate storage area** and be organized neatly to facilitate loading.

in processing, but it is not the only factor driving the trend. Typically smaller MRFs have greater per-ton processing costs. The economic benefit of processing recyclables at larger MRFs must be weighed against the cost of transporting recyclables further distances.

MRF Equipment

If a local government chooses to establish its own processing facility, selecting equipment will be one of the most important tasks and one that carries certain risks. In the selection process, recycling coordinators must make sure that the equipment:

- **Is not overpriced or too costly** for the tonnage that will be processed;
- **Can withstand the demands of processing recovered material**; and
- **Can handle increased capacity** as the program grows.

Recycling coordinators will need to augment the information they receive from various equipment vendors with objective information that allows them to weigh factors important to them and

then rate each equipment option according to this weighted evaluation process. Due diligence includes asking for materials and interviewing MRF operators that use the equipment being considered.

Equipment also can be leased instead of purchased. Equipment leases are typically “capital” leases, in which ownership of the equipment passes to the local government at the end of the lease term, typically with a balloon payment that is equal to the residual value of the equipment. Sometimes this payment can be used instead as a deposit on a new equipment lease. Leasing equipment can allow a local government to obtain new equipment without the need for capital funding.

A variety of sorting, baling, and densifying equipment as well as rolling stock – such as front-end loaders, forklifts – are used to process and move material at a MRF in order to prepare it for sale. All types of MRFs may use the various pieces of equipment described in Table 10.3.

MRF Staffing Requirements

Staffing a MRF usually requires a facility manager, an operations manager/supervisor, enough sorters to process material efficiently, a marketing manager, and an administrative staff. Equipment operators also may be needed as well as a mechanic(s). The number and type of staff

What NOT to Send to a MRF

Certain items can be problematic for MRF equipment. Some items can become wrapped around equipment, such as:

- **Flexible film plastic**;
- **Wires and wire hangers**; or
- **Hoses, string, rope, string lights, and extension cords**.

Such materials can wrap around equipment, bringing it to a halt. Employees have to cut the material loose, which is risky and results in processing down time. Additional materials not typically wanted at a MRF include hazardous materials such as:

- **Flammable and corrosive chemicals** (e.g., cleaners, bleach, acids, lighter fluid, alkaline solutions);
- **Aerosol containers** that are not empty;
- **Batteries**;
- **Mercury-containing light bulbs**;
- **Scrap metal**;
- **Expanded polystyrene packaging** and packaging material; and
- **Sharp non-recyclables** like mirrors and needles.

These materials put worker safety at risk.

Watch How MRFs Operate

- **AMP ONE Cleveland**, Fully Automated MRF, vimeo.com/908132009/9883df941f [2:32]
- **AMP's AI Identifies Recyclables**, vimeo.com/548009294?from=outro-local [0:08]
- **AMP's Solution at RDS Virginia**, vimeo.com/530486811?autoplay=1&muted=1&stream_id=Y2xpcHN8NjM1NDk1NjR8aWQ6ZGVzY3xbXQ%3D%3D [0:45]
- **Van Dyke Recycling Systems**, Single Stream MRF, youtube.com/watch?v=M5nmNKVNCBw [4:58]
- **CalWaste Recovery Systems**, MRF Tour, youtube.com/watch?v=ErYLnBItpk [8:52]
- **Chittenden Solid Waste District (CSWD)**, Behind the Scenes MRF Tour, google.com/search?q=MRF+sort+equipment+how+it+works&oq=MRF+sort+equipment+how+it+works&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIGCAEQLhhA0gEINzMxM2owajGoAgCwAgA&sourceid=chrome&ie=UTF-8#fpstate=ive&vld=cid:e6c24e36,vid:NYux4-KIY1o,st:0 [6:28]



TABLE 10.3: Summary of MRF Equipment

TYPE	DESCRIPTION/USES
1. Storage Bins or Hoppers	These provide the adequate storage needed for incoming and sorted material.
2. Rolling Stock	Front-End Loaders are used (often with bucket attachments and floor guards to protect cement floors) to push material into incoming material storage areas and to push or lift sorted material onto the baler feed conveyor; and to move light bales or loose material to storage areas and load trailers. Forklifts are used for heavier lifting and moving. Rolling stock may operate on gasoline, diesel fuel, propane or, less commonly, electric batteries. Adequate ventilation and good housekeeping practices are keys to minimizing air pollution.
3. Conveyors	Inclined Conveyors move material to a sorting line where a horizontal conveyor carries the material to the sorting stations. - These also are used to convey material into a baler's hopper or the hopper of a densifier. - Conveyors are usually cleated so that material does not "roll down" the conveyor. - Conveyors with adjustable speed motors can compensate for different material types or varying volumes of material.
4. Flatteners/ Perforators	- Machines poke small holes in plastic bottles while squeezing them to allow for air to escape during compaction. - Bottles usually are perforated and flattened immediately after being sorted, but some perforators are mounted on the feed hopper of the baler and can be bypassed for other types of material.
5. Trash Dumpsters/ Compactors	Trash dumpsters provide a container for contaminants that are pulled off the sort line (positively sorted) or contaminants that roll off the end of the conveyor (negatively sorted).
6. Shredders	- These reduce the volume of material (i.e., paper or plastic). - Material must still be baled.
7. Sort Lines	Typically, they are on a raised platform for sorters to drop material from the horizontal conveyor belt into storage bunkers.
8. Bag Rippers	Allows plastic bags to be ripped opened quickly.





TABLE 10.3: Summary of MRF Equipment (continued)

TYPE	DESCRIPTION/USES
9. Belt Magnets	- Magnets are used to pull steel cans from the commingled container stream. - Belt magnets are relatively inexpensive pieces of equipment may be found even at small MRFs.
10. Eddy Current Devices	- Magnetic energy is used to give aluminum cans an electric charge. - Opposing magnetic forces bounce cans off the sort line into a storage bin or directly into a baler or densifier.
11. Optical Sorting Equipment	- Invisible light beams are used to identify specific material types and may be combined with an air jet system to blow the material into the proper compartment. - Mainly used for separating plastic bottles of different resin types. - Other types of optical sorting equipment can be used to separate glass by color and to identify contaminants such as ceramics.
12. Robotics	- Robotic arms receive information from an overhead visual system and positively sort material, placing it into the desired location. - It is possible for robots to make 80 to 100 picks per minute, while human sorters make 20 to 50 picks per minute. - The systems enable real-time data collection to better understand and target contamination and to document bale composition.
13. Air Classifiers	- Air is used to separate material of various sizes and densities. - Often used to remove lighter-weight plastics from a material stream.
14. Screens	- Star-screen systems consist of two beds arranged at steep incline angles where the newspaper is automatically separated from the rest of the stream by 12-point rotating stars. An adjustable oblique or side-angled star screen is then used to automatically discharge the containers from the remaining stream. - Disc-screen systems are similar but the discs only have four contact points. They are less expensive than star screens but generally do not sort as thoroughly because they only have four points to grab material.
15. Trommels 16. Trommel Interior	Large, rotating drums with holes that separate larger items (e.g., cardboard) that will make it to the end of the drum from smaller items (e.g., cans and bottles) which would fall through the holes.

will depends upon the size, volume processed, and level of sophistication of the MRF.

Generally, the greater the mix of material and tonnage throughput, the more justifiable it becomes to substitute sorting equipment for personnel. Staff productivity is greatly affected by the level of commingling and the extent of mechanization. For communities operating MRFs, it is helpful to review staff productivity annually to determine hourly processing costs and to evaluate opportunities for installing equipment to reduce costs. Single-stream processing has become standard practice in MRFs handling more than 40,000 tons per year. There are exceptions as each community has different circumstances that may impact what is optimal.

Consider Contracting

A contract with a private service provider, either a waste hauler or a MRF operator, can achieve the recovery and marketing goals of the community as well as the needs of the service provider if the service is based on a negotiated contract with clear expectations of the roles and risks of each party to the agreement.

To define these expectations clearly, the recycling coordinator must examine weaknesses in past agreements, review agreements used by other communities for equivalent services, be sure to address both short- and long-term needs, and build in flexibility without leaving important provisions open to interpretation. For detailed information on the competitive procurement process and negotiating fair contracts, see Chapter 11.

Chapter 10: References & Resources

- AMP - [ampsortation.com/products/single-stream](https://www.ampsortation.com/products/single-stream)
- Goodman, Tim and Associates, "Materials Recovery Facilities Operational Assessment and Optimization Guide," Office of Environmental Assistance, August 2003.
- Kinsella, Susan and Richard Gertman, "Single Stream Best Practices Manual and Implementation Guide," 2007.
- Lund, Herbert F. "The McGraw-Hill Recycling Handbook," 2001.
- Recycling Today - [recyclingtoday.com](https://www.recyclingtoday.com)
- Resource Recycling - [resourcerecycling.com](https://www.resourcerecycling.com)

Developing an estimate of construction and operating costs for a MRF is very difficult as each one is different. Private-sector MRF developers and operators are reluctant to share their costs and public entities often use accounting procedures that prevent "apples-to-apples" comparisons. To a large degree, MRFs are customized due to differences in buildings, conveyor lengths and heights, and access issues, among others.

Alternative Processing Technologies

The technologies previously described apply to source-separated recyclable material. Additional technologies are being considered by some communities in the United States and Canada to convert waste or specific waste streams into recyclable resources, energy, and/or beneficial byproducts. These technologies may blur the lines between disposal, recycling, and diversion. Some processes are suitable for mixed municipal waste while others might be used for a source-separated material that is not recyclable.

Some of the processing technologies currently being pursued in the United States include biological and thermal. They are described in more detail below.

- **Biological** - Biological treatment technologies use microbial action to biodegrade the organic fraction of MSW [e.g., composting, anaerobic digestion, hydrolysis/fermentation (waste to ethanol)].
- **Thermal** - Thermal technologies use heat to convert solid waste to energy and other byproducts. These technologies differ from traditional combustion by using less or no oxygen (e.g., conventional gasification, plasma gasification, pyrolysis, autoclaving).

In addition to these technologies, some communities have mixed waste processing to separate recoverable material mechanically (e.g., organics, paper, plastic, metals) from the mixed waste stream. Some refer to this type of facility as a "dirty MRF." Such facilities are uncommon in the U.S. While they may provide greater convenience for generators, they also result in much lower recovery rates than "clean MRFs" and can result in lower value materials.

Effective Contracting for Recycling Services



CHAPTER 11

Contracting for Services with Private Entities

A strategy available to local governments that do not offer recycling services directly (i.e., by collecting material with their own vehicles and collection crews and/or processing material at a facility they own) is to develop a process that allows private entities to compete for the ability to serve the municipality or county. This strategy is appropriate for solid waste collection and disposal services as well as for collection and processing of recyclables.

The objective of a competitive process is to ensure that the needs of the local government and the service provider are met. This occurs through a contractual arrangement that results in contracting with a qualified service provider at a cost-competitive rate through a mutually beneficial agreement. In most cases the competitive process is initiated by the local government by issuing a Request for Proposals (RFP). The RFP – an invitation for potential suppliers to submit proposals offering a specific product or service – must be carefully developed to secure the desired product or service. The advantages of using private entities include the fact that they generally possess:

- **The ability to raise capital** for developing facilities and to purchase capital equipment such as collection vehicles, carts and other containers;
- **A “built-in” desire** as profit-making companies to maximize efficiency, minimize costs and fully use equipment and facilities;

DEFINITION

PRIVATIZATION – Changing a service from public ownership or control to private ownership or control. In solid waste and recycling collection, this is often done through a competitive procurement process resulting in a contract or franchise agreement with a private hauler(s).

- **Greater ability to access innovative technologies** – often governmental entities must be risk averse and therefore are unlikely/unable to invest in innovative technologies; and
- **Economies-of-scale, equipment, market leverage and expertise** that may not be possessed by local governments.

Critical to the success of this strategy, however, is the need to ensure that competition exists among service providers and monopolies do not result over time.

The Benefits of Organized Collection

If the area is currently served by several haulers under an open collection system (i.e., where residents hire their own service providers), reducing the number of haulers serving the area by some form of organized collection can:

- **Result in increased operational efficiencies** that can, in turn, result in lower rates to customers;

DEFINITION

OPEN COLLECTION – Haulers work in a “free market” where customers (residents and businesses) hire their own hauler; also referred to as a “subscription” system.

DEFINITION

ORGANIZED COLLECTION – The local government ensures that solid waste and recycling services are provided in the manner they desire either through providing the service directly or by contracting or franchising with one or more haulers.

- **Reduce traffic, associated wear and tear on roads, reduced noise and improved safety and aesthetics** (e.g., recycling bins are only set on the curb one day of the week in a neighborhood); and
- **Provide the local government with more control of the system** including the ability to develop uniform education and outreach material and collect data as well as the ability to initiate certain requirements. These may include:
 - Volume-based pricing for garbage collection;
 - Collection of certain types of material for recycling; and
 - Same-day collection of recyclables (and possibly yard trimmings) along with garbage collection for all residents.

Considering Franchises

Organized, exclusive, competitively procured solid waste and recycling service contracts allow the local government to have more control than open (subscription) collection systems where residents hire their own haulers and the local government only has to manage a relationship with one company. However, this arrangement may not be appropriate for every community.

Table 11.1 on the following page presents the advantages and disadvantages of open subscription-based systems and organized, exclusive collection systems.

Resource Management Contracting

U.S. EPA promoted the concept of "resource management contracting," which compensates haulers based on their ability to help the community achieve their material management goals.

Resource management essentially aligns waste contractor incentives with the local government's goals to encourage innovated approaches that foster cost-effective resource efficiency through prevention, recycling and recovery.

Of all of the disadvantages associated with a competitively procured system (e.g., organized, exclusive), the one that generates the greatest concern is the potential for one relatively large hauler to become the franchisee or contractor, resulting in lost opportunity for small haulers and potentially a lack of competition over time.

A franchise system, however, could be established that allows more than one hauler to serve the municipality or county – allowing multiple haulers

DEFINITION

FRANCHISE – A formal agreement between a public entity and one or more private entities (depending on whether the agreement is exclusive or not) to provide services in a particular area. Franchises often are awarded through a competitive procurement process, which also may include a negotiation process. When a local government has a franchise agreement with a hauler, the local government tends to have less involvement in the service [e.g., usually the billing and customer service is handled by the service provider(s)]. In some regions of the country, the local government sets the rates and franchisees must charge the rates prescribed.

- **EXCLUSIVE FRANCHISE** – A right to provide service in a specified area (e.g., district, town, county) is granted to one hauler only – there is no hauler option.
- **NON-EXCLUSIVE FRANCHISE** – A right to provide service in a specified area (e.g., district, town, county) is granted to more than one hauler – customers select their own hauler among the franchised haulers.

DEFINITION

MANAGED COMPETITION – Public agencies are given the opportunity to compete for business with the private sector for the provision of services including solid waste and recycling collection. The public entity participates in the bid process along with the private bidders.

(even smaller ones) to continue to operate in the jurisdiction.

Serving multiple counties could be accomplished in two ways:

1. **Establish a limited number of franchises** - which allows franchised haulers to serve in all regions of the municipality (a non-exclusive franchise); or
2. **Divide the community into distinct geographic regions or zones** and have each franchised hauler be the exclusive hauler in one or more zones. In this manner, the operational inefficiencies and environmental and aesthetic impacts described in Table 11.1 will be mitigated.

The implications of each of the above factors, among others, need to be considered in light of individual communities' needs, resources and market positions.

Seven Steps to Effective Contracting

- 1 **Precisely define services to be contracted.** The complete geographic area, population, number of households/businesses (if applicable) and number of municipalities (if applicable) must be defined for potential service providers. The complete range of services desired - the nature and type (e.g. collection, processing, transportation, marketing of

TABLE 11.1: Comparison of Open (Subscription) Collection and Organized, Exclusive Collection Services

SERVICE DELIVERY MODEL	ADVANTAGES	DISADVANTAGES
Open (Subscription) Collection	• Offers maximum customer choice. • Very limited government involvement is required. • Provides opportunities for small haulers. • Competition encourages haulers to keep prices competitive (although costs may actually be higher than in "organized" systems).	• Increased air pollution, noise, and road impacts from multiple haulers serving a community may occur. • Very limited government involvement is required. • May negatively affect the neighborhood. • Lack of uniformity in service levels is possible. • Governmental entities have a reduced ability to enforce policies and/or goals. • Routing inefficiencies and lack of economies of scale often result in higher costs.
Organized, Exclusive Collection	• Often results in lower rates and provides some governmental control over rates. • Service providers are selected on the basis of technical and financial ability to provide the requested services. • Local government has more control and contract items often include penalties/remedies for poor or non performance. • Results in a more consistent level of service for customers, making it easier to implement a comprehensive outreach/education program. • Fewer collection vehicles on the road can result in improved neighborhood appearance and safety as well as reduced road wear and environmental impacts.	• Small haulers may not be able to compete with larger regional or national service providers. • If contracted, governmental entities must invest staff resources in managing the competitive process and auditing hauler performance. • Customers do not have the ability to choose their own hauler. • There is the potential for quality-of-service issues due to "low-ball" pricing.

material, communication, education, program administration, operation) – also must be specified in a clear manner.

The duration of the contract should be designed to reflect both the needs of the local government and the realistic capabilities of the potential bidders. For contracts requiring the purchase of equipment, contracts should match the life cycle of the equipment being purchased. If the contract is too short, the contractor must capitalize the equipment over the period of the contract resulting in sub-optimal pricing and cost. If the contract exceeds the equipment lifespan by a year or more, the contractor will incur expensive extended maintenance or costly new equipment that must be built in to the price. Current life-cycle expectations for new collection trucks, for example, are about seven years.

2 Determine contractor pool and market position. The local government must determine whether the customer base is large enough that it has bargaining power. Good results are more likely to come from a minimum of three to five bidders. In rural areas, bargaining

Establishing Mutually Beneficial Terms

A contract should result in the local government entering into an agreement with a qualified hauler that provides specified services at a price that represents a good value relative to that offered by competitors.

There may be some trade-offs with quality. Ideally, contract specifications will:

- **Clearly define acceptable levels of service;**
- **Encourage the MRF and/or hauler to maximize revenue** from the sale of recyclables;
- **Encourage higher material recovery rates;** and
- **Enhance working relationships with service providers.**

power may be improved by bundling services or partnering with other communities to increase the attractiveness of potential business. On the other hand, if the service area is too large, as may be the case in urban areas, this also can limit the number of suitable contractors. In this event, it may be desirable to de-bundle services or break up the service area into districts to allow more bidders the opportunity to compete.

With respect to recycling collection and processing, the leading practice is to structure the procurement process to allow for separate contracting for collection and processing when feasible. With this approach, it is best to handle the procurement process for processing in advance of collection or to specify a MRF location so potential collection service providers will know the location of the MRF and can structure their proposals/bids accordingly. Obtaining separate prices for collection and processing, even if under one contract, is preferred. Also, if additional material is to be added during the course of the contract, address whether/how that will affect cost in the RFP/contract.

3 Prepare a detailed and clear Request for Proposals (RFP), Bids (RFB) or Quotes (RFQ). The local government will have to decide whether the services requested warrant an RFP, RFB or RFQ. An RFQ is essentially the same as an RFB. RFBs and RFQs work best when services are already defined, all bidders are qualified and price is the sole deciding factor. Such a bid may be used when replacing a recycling truck that has worked very well with one that is exactly the same or for installing fencing at recycling drop-off site.

An RFP is normally used when the job demands more complex requirements. An RFP is appropriate when the local government is receptive to different approaches to delivering the service. Carefully defining the desired results or outcomes and allowing the bidders to present their own means to achieve the desired outcome often may yield additional opportunities. For example, the bidder may offer ideas or additional complementary services that the local government had not previously considered. An RFP is used when price is not the sole determining factor in contractor selection. Some local governments use a “two-envelope” system in evaluating proposals generated by an RFP – the technical proposals are placed

in one package, evaluated and ranked. After that, a specified number of top-ranked cost proposals are removed from the second package and evaluated. The remaining cost proposals are returned unopened. See the Appendix C to review further detailed information regarding components of a robust RFP and contract.

4 Employ a fair and transparent contractor selection process. To make sure all potentially qualified companies have the opportunity to respond and to avoid challenges to the RFP, the local government must use a fair, transparent and defensible contractor selection process. Follow local government procurement guidelines, with the aim of eliciting interest from as many potential service providers as possible. The local government website, mailing lists, trade press and business publications are typical means of advertising RFPs.

In order to learn about the capabilities and interests of potential contractors in advance, consider pre-qualifying bidders through either an RFQ in advance of the RFP or through a pre-proposal/bid meeting with potential contractors. The number of companies that respond to the pre-qualification process will reveal the effectiveness of the advertising and promotion. During proposal and bid development, have a clear and easy process for potential contractors to ask questions. Provide the answers in a transparent process so that all contractors have an opportunity to view them.

Lastly, clearly describe the evaluation criteria to ensure that contractors who are not qualified don't spend time developing a proposal and that bidders who respond to the RFP provide all requested information. Always require and verify references.

Deciding on Privatization

How does a local government that has been providing recycling services make the decision to issue an RFP to consider allowing the private sector to provide these services? While there is no one correct answer because all needs and priorities differ, the following should be considered:

- 1. Customer Service** – Sometimes private sector providers are able to provide better levels of service or offer additional services. Consider whether these service improvements will help the local government move closer to recycling, diversion, and other goals.
- 2. Government-Owned Assets** – If the local government owns assets they expect to become idle if privatization occurs, they can consider options for such equipment. Examples: transferring equipment to a different department; selling the equipment in the marketplace; or selling the equipment to the new service provider as part of the contract.
- 3. Personnel Resources and Implications** – If workers will be displaced, consider whether there are other positions to fill. Privatization may also allow local governments to fill existing vacant positions. Consider which services the local government wishes to provide and has the ability to maintain including billing, customer service and contract monitoring.
- 4. Competition** – Consider the level of competition for proposed services and how many service providers are in the area that are likely to bid on services. If uncertain, it may be wise to issue a Request for Interest (RFI) before developing a full RFP. If there are many small haulers in the area, consider whether dividing the area into districts might elicit more interest.
- 5. Past Experience** – Consider whether the local government has prior experience contracting with service providers in other departments or if nearby local governments have had such experience. Ask for suggestions and guidance on what they learned from their experiences.
- 6. Current and Potential Costs** – Try to assess current costs in a way that can be compared to similar services being provided in nearby communities.

Potential selection criteria include:

- **Cost;**
- **Responsiveness to RFP, RFB or RFQ;**
- **Technical soundness of response;**
- **Innovativeness;**
- **Related experience and qualifications;**
- **Facility/operational capacity;** and
- **Financial stability.**

5 Negotiate a partnership-oriented contract. In developing the contract, build upon the terms and conditions specified in the RFB/RFP. Incorporate incentives for improving performance

on the part of the contractor. Allow flexibility for amending the scope of work to address changing circumstances including unexpected events such as adding new commodities to the program. Incentives might include increased payment for increased recycling tons or recycling rates. This is especially helpful when haulers have some education/outreach responsibility.

6 Consider opportunities to build risk-sharing into the contract. For example, consider index-based monthly fuel adjustments and/or index-based annual payment escalation to accommodate future price fluctuations in an equitable manner. By doing so, the bidder will not have to inflate the cost of the proposal to cover a potentially risky cost scenario.

Attracting Potential Bidders

The result of an effective procurement process is competition among several potential bidders. If only one or two companies bid, it may be necessary to re-examine the RFP to discover why more bidders did not respond. Potential questions for re-examination include:

- **Are the services being solicited difficult for service providers to perform (e.g., impassable roads, difficult-to-access sites)?** Insisting that haulers provide services that are difficult to perform or that could jeopardize their equipment or worker safety will result in fewer bids and/or more costly bids. It can be helpful to speak with haulers about agreeable compromises before the RFP/RFB is developed. Also, ensure that requested data is possible to obtain and allow flexibility in how it is provided.
- **Are equipment specifications overly burdensome (e.g., a dedicated fleet or expensive equipment)?** If you know the equipment used by haulers before issuing an RFP/RFB, you can have a better understanding of what is realistic. It may be beneficial to identify a level of service desired without specifying the type of equipment to be used or issue the RFP requesting pricing options with current technology and using a new, different technology. Hauler interviews can elicit additional information regarding barriers to using new collection equipment/technologies and may result in some win-win compromises.
- **Can the volume of business be expanded through inclusion of additional municipalities or bundling of services to make the contract more attractive?** Smaller communities may not have much leverage in the marketplace to attract service providers, especially if they do not operate in the geographic region. Alternatively, contracting opportunities may be split up to provide means for small and large service providers to bid and/or more than one contractor can be engaged to provide services. If a community is large enough, it may make sense to divide the area into service districts.
- **Is too much risk being placed on the service provider?** Sharing risk can result in less costly fees as the processor or hauler does not have to “plan for the worst” possible commodity pricing outcome. **EXAMPLE:** price-driven flexibility built into the contract.

After the Contract Is Signed ...

- **Monitoring performance** (e.g., tons collected, customer service calls/complaints, contamination levels, materials pricing);
- **Continuously monitoring contract compliance** (e.g., safely compliance, fuel cost adjustments, container maintenance, etc.); and
- **Investigating and addressing issues immediately.**

Chapter 11: References & Resources

- R.W. Beck (for PA DEP), “Effective Contracting for Recycling Programs,” (Training Session), April 2006.
- U.S. Environmental Protection Agency - epa.gov
 - Managing and Transforming Waste Streams - A Tool for Communities - epa.gov/transforming-waste-tool
 - Resource Management - archive.epa.gov/epawaste/conserve/smm/wastewise/web/html/rm.html
 - SMM Web Academy - How to Negotiate Your Contract with Waste Haulers - archive.epa.gov/epawaste/conserve/smm/web-academy/web/html/may12.html

Notes:

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Funding Recycling Programs



Sustainable Recycling Program Attributes

A sustainable recycling program is self-sufficient in its ability to fund and provide highly effective recycling services as part of an integrated material management system. In a sustainable integrated system, all elements—waste reduction, recycling and disposal – work together and complement each other.

While some funding may come from external sources, sustainable integrated programs are designed to be self-supporting regardless of changes from outside support or municipal budgeting priorities.

A sustainable program features a number of key attributes including:

- **Sufficient and reliable funding exists to cover all program costs** including investments in improved technology;
- **Waste diversion and recycling market development incentives exist** and result in higher levels of diversion;
- **Costs and revenues associated with each program component are known and tracked separately** (e.g., not “bundled”), providing transparency;
- **The local government sees recycling as a business** and actively promotes the startup and expansion of local and regional recycling businesses as well as market development efforts for locally generated material, as appropriate;
- **Public understanding, awareness and support of programs exist**;
- **Ongoing education and outreach efforts are undertaken** and existing state and national educational, informational and technical resources are leveraged, as appropriate;
- **Program managers review, evaluate and optimize program efforts**, documenting these activities; and
- **Integrated solid waste management planning sets the stage**.

Although in practice few programs can achieve all of these attributes, they nevertheless describe an ideal system that local governments can aspire to achieve. This chapter focuses specifically on obtaining sufficient and reliable funding for recycling programs.

Program Costs

Recycling program costs that need to be covered by one or more funding sources fall into two categories: capital and operating.

CAPITAL COSTS

These are typically one-time costs incurred when a facility is constructed, remodeled or expanded. Such costs can include land and site development. Capital costs may also include costs associated with other major items such as vehicles, equipment, curbside recycling bins and carts and drop-off site containers.

These costs often exceed the amount that can be covered within the department’s annual budget. Therefore, local governments often use other funding sources and, of course, amortize costs over several years.

Some of these sources and their features are listed below.

- **General Obligation Bonds** – Require full faith and credit of the local government and thus approval of a referendum by voters. They also count toward the local government’s allowable debt limit and may be taxable or tax exempt.
- **Revenue Bonds** – Require a secure source of revenue to pay debt; do not count toward the local government’s debt limit; and do not require a referendum on the ballot.
- **Special Purpose Local Option Sales Taxes** – Require voter approval to temporarily add to the local sales tax; must be for a very specific purpose and for a limited time period; and reduce financing costs because little to no debt is incurred.

- **Private Financing** – Results in a facility or other capital being financed by a private owner or operator who charges a fee to cover the capital outlay and typically results in less public control over operations.
- **Grants** – These are available from the Office for general recycling infrastructure and specific projects and from a variety of other sources.
- **Lease Backs** – These result in a public entity building a facility, immediately selling it to a private company in order to free capital and then lease it back from the new private owner and operating it either directly or through a contractor. Sometimes they result in ownership going back to the public sector after a specified time period.

OPERATING COSTS

These are the costs that are required for the day-to-day operation of programs and facilities. Potential costs include labor and fringe benefits, building and equipment maintenance, fuel and utilities and engineering and program administration. Full-cost accounting requires documenting the direct cost of solid waste management program and facilities and considering indirect costs.

Some of the most significant indirect costs are the resources provided by other departments that support solid waste management and recycling activities such as purchasing, auditing, accounting, information and technology, utilities billing and legal services. In South Carolina, local governments are required to account for both direct and indirect operating costs in their full-cost disclosure report.

Operating Cost Funding Options

Although many local governments rely on general funds as the primary source of funding for their programs, this is no longer regarded as a best practice.

Two primary reasons for this are:

1. **The competition for funding** from other departments and programs; and
2. **The lack of incentives** for waste reduction and recycling are inherent in this funding source.

Numerous alternative funding mechanisms are available to cover operating costs and provide funding over the long term to fund facilities and equipment. These specific mechanisms all have their strengths and drawbacks and no one funding mechanism or set of funding mechanisms is the “right choice” (or even an option) for every community. Funding mechanism options include: a disposal facility fee, recycling facility fee, obtaining material sales revenue, charging a service fee, pay-as-you-throw (PAYT), and increasing property tax millage rates.

DISPOSAL FACILITY FEE

Many local governments use a portion of the fee charged at their landfill or transfer station to fund costs associated with their solid waste management system including recycling costs. In many cases the tipping fee supports multiple solid waste management services including collection and/or processing of recyclables and collection and processing of yard trimmings. Some local governments set aside a portion of their tipping fees to cover future capital costs. For example, at some landfills, a portion of the tipping fee is deposited into a fund to pay for future closure and post-closure costs of the landfill in addition to future development costs.

Funding recycling programs with tipping fees at a landfill is a simpler funding mechanism to implement and administer than many other funding options and is likely to increase revenue in the short term. The main challenge with this strategy, however, is that as more program costs are supported by the tipping fee, the per-ton tipping fee must increase, even when competition from neighboring facilities may exert pressure



Greenville County's Materials Recovery Facility

to reduce tipping fees. Similarly, if a community is very successful with their waste reduction programs, they would have to increase tip fees just to keep revenues stable. In areas with strong competition from transfer and disposal facilities, establishing tipping fees high enough to cover both recycling and disposal costs may be counterproductive.

RECYCLING FACILITY FEE

Private material recovery facilities (MRF) often charge a processing fee to collectors delivering material to the facility. Some local governments that operate MRFs are beginning to do the same. A processing fee at a recycling facility can be a flat fee; but more often the fee is tied to the quantity of material delivered.

Fees charged on material that costs more to process – or those for which market value is low – are accepted at a higher fee. For example, many facilities nationwide charge a fee for single-stream material or commingled containers, but do not charge for mixed fibers or source-separated material.

Steps to Implement Disposal Fees

1. **Determine whether current tipping fee revenues could support recycling costs** without an increase.
2. **If not, determine the increase in fees or fee surcharges** necessary to support recycling services.
3. **Compare proposed tipping fees** to those paid at competing facilities. Try to obtain actual rates paid such as those paid by communities that contract for disposal, not gate rates or posted fees. Consider other factors such as transportation costs, which impact total disposal costs.
4. **Notify customers of the reason, the amount of increase and when it will occur** if an increase in fees is deemed appropriate.
5. **Develop mechanisms** to ensure that the fee set up for recycling is allocated for that purpose.

Often, when MRFs charge processing fees, they also provide revenue sharing opportunities as a means of providing incentives for suppliers to deliver more material and to share both the risks and rewards of material price fluctuations.

OBTAINING MATERIAL SALES REVENUE

With this funding option, a local government receives all or a portion of the revenue obtained by the processor from the sale of recyclables. This arrangement typically is found when a local government runs their own MRF or has an agreement with another entity (e.g., a private company, an authority/local government) to process and market recyclables collected by or on that local government's behalf.

Some local governments have found that the revenues received from the sale of recyclables significantly offset the costs of their recycling program. While revenue from material sales can provide a welcome source of funding, depending on these revenues is risky since the price for which material can be sold fluctuates significantly. Revenue-sharing terms typically are based on the type of material, the tonnage and the form in which material is delivered (e.g., single stream, dual stream, separated).

In some cases there may be a deduction for high contamination rates. Revenue can be a fixed price per ton or vary based on a published market

Steps to Implement Recycling Facility Fees

1. **Determine the fee necessary to support recycling costs to be covered** (usually MRF operating costs).
2. **Compare proposed fee schedules** to those at competing facilities.
3. **Notify customers of the reason and amount of the fee** if deemed appropriate.
4. **Revisit costs and fees periodically** and adjust accordingly.
5. **Consider providing revenue sharing** as a means of encouraging the delivery of more/higher quality recyclables.

index, sometimes with fixed minimum (also known as “floor”) or fixed maximum (also known as “ceiling”) levels negotiated into contracts.

Some local governments that contract for the processing of recyclables choose to receive the majority of the material sales revenue, thereby bearing the larger share of market risk. This helps keep contractor (private processing) costs down as the contractor will protect itself from market risk. The processor should receive some revenue to provide an economic incentive for maximizing the amount of material marketed and processing material to a sufficiently high quality.

If using a privately operated MRF, the local government can sometimes negotiate a contract for its material directly with the mill or end-user, then incorporate this marketing contract into the overall processing contract. Recycling coordinators should work to ensure that revenue from the sale of recyclables is reinvested into the recycling program rather than placed in the local government’s general fund. This should be the case even if the revenue is shared with a private contractor.

CHARGING A SERVICE FEE

Service fees are collected directly from residential and/or business customers that use recycling services. The fees are generally included on a monthly or bi-monthly utility bill. Some

communities charge a service fee specifically for recycling, while others cover the recycling service costs through a solid waste management service fee that includes collection and disposal.

The latter approach of one combined fee is most consistent with the way private companies charge for their solid waste and recycling services, as customers receive a bill reflecting the fee to provide the service over a certain time period. In addition, this approach can be structured so as not to discourage recycling by having customers pay the same fee based on services provided regardless of whether or not they are used. (Recycling is provided at no extra cost.)

Service fees provide a stable funding source. They may vary based on customer type as well as type of service received. For example, single-family units may be charged a different rate than multi-family units. Businesses may be charged a rate based on the type of business or square footage of property. Customers can be charged different rates based on the specific services they receive (e.g., extra pickup days, bulky item pickup), however this requires a more robust billing system and may require extra labor costs.

When recycling service fees are included as a part of a monthly utility bill along with charges for water, solid waste services and/or electricity,

Steps to Obtaining Material Sale Revenues

1. **Evaluate** the marketplace competitiveness.
2. **Develop proposal criteria** based on local government’s priorities.
3. **Prepare and issue a Request for Proposal** to process and market recyclables with specified revenue allocation terms.
4. **Evaluate responses** based on established criteria.
5. **Always negotiate.**
6. **Continuously monitor market prices** and end markets.



customers are more likely to pay for the services than in cases where recycling or solid waste fees are billed separately, since another utility (e.g., an electric utility) may discontinue service if customers do not pay for all services provided.

An alternative to charging fees as part of a utility bill is to place the fees on the annual tax bill. Rather than the customer being charged directly, this approach charges property owners, who are not always those receiving the service.

This method also minimizes non-payment risk, as a lien can be placed on a property in the case of non-payment. Richland County, for example, includes its solid waste service fees on annual property tax bills.

PAY-AS-YOU-THROW (PAYT)

This user-fee system charges residents for solid waste collection and disposal based on the amount of waste they discard. Recycling service is provided as a means to reduce the amount of waste requiring disposal. The cost of recycling services is typically included in the base-level PAYT fees. Some PAYT programs bill customers on a utility bill, charging a variable rate depending on the size of the container that the customer has requested.

Another alternative is to require residents to purchase special bags for garbage or tags or stickers that must be affixed to each garbage set-out. Many local governments implement PAYT fee systems to more equitably distribute the cost of solid waste collection and disposal and to encourage waste reduction and recycling.

The cost of recycling may be factored into the rates charged per container, bag, tag or sticker or residents are charged a “base fee,” which covers a base level of garbage collection and recycling. PAYT can be used in curbside collection programs as well as when solid waste is collected directly from generators at recycling drop-off sites.

INCREASING PROPERTY TAX MILLAGE RATES

In this option, the cost of recycling (and/or solid waste programs) is included on the property tax bill either as a separate millage line item or is embedded in the general millage rate.

Local governments establish millage rates that cover the annualized cost of recycling or other

Steps to Implementing a Service Fee

1. **Determine costs for services** to be covered by the service fee.
2. **Determine how different types of customers will be billed for service** (e.g., single-family, multi-family, mobile homes, businesses, etc.).
3. **Determine the billing system that will be used** and the frequency of billing.
4. **Ensure enforcement mechanisms are in place** to minimize risk in the case of non-payment.
5. **Determine how to handle vacant units** or seasonal units.
6. **Involve stakeholders throughout the process** to build understanding and support for a fee-based approach.
7. **Work with other departments** (e.g., tax and mapping) to identify all entities to which the fee applies.

Steps to Implementing PAYT

1. **Determine per-customer cost of services** to be covered by the PAYT fee system.
2. **Ensure all service providers** are on board.
3. **Determine rate structure** and set up in billing system.
4. **Develop ways to produce and distribute** containers, bags, tags or stickers.
5. **Educate the public** about the reasons for the rate structure.
6. **Provide for enforcement** in the case of non-payment.
7. **Provide ample time and information** to ensure all customers know what to do and to get new system in place.
8. **Monitor cost and revenue** and adjust fees periodically as appropriate.

solid waste management services. All property owners pay these fees, with the premise being that everyone who owns property benefits from the services provided.

Another premise is that these services should be available to all residents, businesses and institutions and that the use of these services should be encouraged. If the millage rate is set appropriately, the revenue covers the cost associated with the services provided.

One of the drawbacks of this funding approach is that the assessment is not based on the level of service received or quantity of waste disposed of, but rather on the value of the owners' real property. Some communities also develop provisions for abandoned properties to be exempt from this portion of the property taxes.

Steps to Increasing Property Tax Millage Rates

1. **Test the political acceptability of an increase** to the current millage.
2. **Determine the costs** to be covered with the millage.
3. **Determine how the increase will be allocated** to cover the costs in millage for different classes of property (i.e., residential, commercial).
4. **Recognize that changing the millage rate can be politically difficult**, so set the rate in a manner that will not require changes each year.
5. **Obtain political support.**
6. **Work with the department that administers property taxes** to determine how and when millage will be added and collected.
7. **Implement mechanisms** (e.g., an enterprise fund) that enable collected funds to be used only for the purpose intended.
8. **Monitor service costs** as well as millage revenues and adjust millage rates periodically.

Aiken and Hampton counties, for example, rely heavily on a tax millage to fund their solid waste and recycling programs. Additional funding is provided through the general fund, tipping fees or revenue from the sale of recyclables.

Supplemental Funding Mechanisms

A number of funding mechanisms exist that can be a source of additional funding for programs. The following are the most common mechanisms.

- **Host Fees** - Fees paid by a solid waste management facility operator to the county or municipality in which it is located. The purpose of a host fee is to offset the impacts that result (e.g., increased traffic, odors, noise) from having a waste management facility, usually a landfill or waste-to-energy facility, operating in a community. Some local governments have used host fee revenues to help support their own solid waste management and recycling programs.
- **Franchise Fee on Waste Haulers** - Some states authorize local governments to issue a franchise to private haulers to collect solid waste and/or recyclables. In these cases, a franchise fee is often paid to the local government to offset the impacts of the franchisees operating within their communities. Thus, the funds are typically directed to maintaining roads, bridges and right-of-ways that are impacted by increased truck traffic. Depending on the state and local laws guiding franchises and the way franchise agreements are written, local governments may use a franchise fee to support solid waste and recycling infrastructure. A franchise fee can be a flat rate, a fee per customer, a fee per cubic yard/ton collected or a percent of revenues.
- **License or Permit Fee on Waste/Recycling Haulers** - Many municipalities and counties require that a solid waste license or permit be issued as part of their enforcement program to ensure that solid waste and recycling haulers follow environmental health and insurance standards. An annual fee is typically charged in connection with this license to cover the cost of program administration. Licensing/permit fees often are charged per vehicle.

- **Avoided Disposal Costs** – Each ton of solid waste reduced, recycled or otherwise diverted to a beneficial reuse, is a ton of waste that was not disposed of in a landfill. In an integrated solid waste management system, where each element – waste reduction, recycling and disposal – is considered part of the same system, the avoided costs of disposing of a ton of waste can be accounted for as a positive contribution to the economics of the recycling system. For example, if a local government adds material to its recycling drop-off sites and as a result one less 40-yard container of solid waste is disposed of in the landfill, the hauling costs and tipping fees associated with that waste, which were saved, could be assigned as part of the recycling program's revenue stream. While this may appear to some to be an accounting exercise, these are real benefits that deserve

consideration in a cost-benefit analysis of recycling. When full-cost accounting is done properly or when operating with an enterprise fund, the tracking of avoided disposal costs is relatively simple.

- **State Grants** – Grants are an important source of funding for recycling programs as they often cover start-up costs and incremental costs of recycling system improvements such as new containers or programs to expand acceptable material. They also are used for public education and awareness programs. The Office provides grant funding for programs to manage material banned from landfill disposal as well as other items. See Table 2.1 in Chapter 2 for a summary on grants.
- **Other Grant Resources** – The Office has compiled a list of additional funding opportunities through grants from various sources.
- **Corporate Sponsorships** – Sponsorships can help supplement recycling programs either with funding for education, services, or equipment. Examples include beverage vendors providing recycling bins at schools and electronics manufacturers hosting e-scrap collection events.

10 Tips for Writing Successful Grant Applications

1. **Be specific** in your budget.
2. **Keep careful and organized records** so you can provide information when requested.
3. **Involve others** in supporting your project but make sure they have a purpose.
4. **Make follow-up a part of the process.**
5. **Obtain letters of support** that demonstrate a commitment on the part of collaborators and an understanding of the role they play.
6. **Research every funding source** you intend to apply.
7. **Tailor each proposal** to the specific funding source.
8. **Don't include unnecessary material** in your application.
9. **Contact program staff and attend conferences and information forums** the funding source may offer.
10. **Frame questions** to acquire a meaningful response.

Funding Public Education & Promotion

A commonly used rule of thumb is that funding for recycling education and outreach should be about \$1 to \$2 per household per year – more if changes are being made to the program or if a new program is being implemented.

Many communities, however, lack the financial resources for sustained outreach at this level of funding. A focus on relatively inexpensive print information combined with web-based tools and active personal outreach can provide cost-effective solutions.

Regardless of the funding level, the program will benefit from material that is visually appealing and has a professional look.

Tax Incentives for Recycling

Tax incentives are ways in which governments can increase investment in recycling infrastructure by offering credits or exemptions on sales, income or property taxes at the state or local level for the purchase of equipment or machinery used in recycling.

On a local level, tax incentives may be only marginally effective. The tax burden imposed by local governments on manufacturers or other private-sector recycling companies is relatively small and a break on this expense may not register as significantly offsetting the price of the desired equipment. On a state level, however, tax credits may be more effective. According to U.S. EPA, 25 states including South Carolina, offer recycling tax incentives.

Recycling investment tax credits (RITCs) are a slightly different form of recycling assistance. In these instances, the government gives a credit on

income taxes to anyone who invests in recycling infrastructure. RITCs have been referred to as direct subsidies to capital investments. RITCs can be targeted to offset specific taxes – often the corporate income tax – that have much larger financial impacts on potential investors. With a potentially significant dollar savings, these tax incentives are more likely to influence decision makers.

Enterprise Funds

Many local governments have removed their solid waste operations from the general fund and account for solid waste management services as a separate enterprise fund. An enterprise fund is a self-sustaining cost center that operates similarly to private businesses. The primary purpose of establishing an enterprise fund is to isolate all solid waste revenues and expenditures for purposes of accountability. Costs are clearly identified and recovered.

Recycling programs are often part of a solid waste management enterprise fund that charges fees and collects revenue to cover all solid waste program costs. Revenue is deposited into the enterprise fund to cover enterprise operation costs.

This approach to funding can be very effective because it prompts accurate cost determination and fiscal responsibility and encourages resourcefulness and efficiency to make good use of funds. In contrast, with general funds there is often no incentive to reduce costs and, some would argue, that there is an incentive NOT to reduce costs. In addition, enterprise fund programs have dedicated funding and consequently are not in competition with other public programs for funding.

A Blueprint for Financial Sustainability

Given the variables and unique environment in any local government, there is no single approach to ensuring financial sustainability for a program.

One or more practical steps may be applied to take advantage of specific short-term opportunities or they may be implemented as a comprehensive, systematic strategy for building financial sustainability over the long term. Stakeholder input is important throughout the entire process.

PalmettoPride Grants

PalmettoPride, the state's anti-litter and beautification organization, offers a variety of grant programs that may supplement existing funds.

- **Keep South Carolina Beautiful Grant** provides funding to certified South Carolina Keep America Beautiful affiliates for the purpose of creating and maintaining successful litter reduction and beautification programs;
- **Tree Grant** is a non-monetary award that donates trees to be used in beautification projects around the state; and
- **Litter Prevention Grant** is a competitive grant that provides organizations up to \$10,000 to develop successful anti-litter programs and enforcement activities at the local level.

For more information, call **(877) 725-7733** or visit palmettopride.org.



TABLE 12.1: Advantage and Disadvantages of Operating Cost Funding Options

FUNDING OPTION	ADVANTAGES	DISADVANTAGES
Disposal Facility Fee	- Increases revenues in short term; - Easier to implement and administer than other options; and - May be possible to institute a tipping fee surcharge at private facilities.	- Not related to recycling service; - May result in higher tipping fees that discourage the delivery of waste where competing facilities exist; - As waste is reduced through recycling and other programs, revenue from tipping fees declines; and - May be feasible only for publicly owned disposal facilities and transfer stations.
Recycling Facility Fee	- Easier to implement and administer than other options; - Related to the service; and - Reduces risks associated with recycling market volatility.	- May discourage the delivery of recyclables; and - Costs do not necessarily decrease with tonnage so reduced tonnage may result in higher per-ton costs.
Obtaining Material Sales Revenue	- Tied directly to recycling activity and thus provides an incentive for recycling; - Provides incentive for increased local government cooperation; - Most politically acceptable funding mechanism since no new fee is imposed; - Assists in record keeping and reporting of tonnage by private MRF; - Reinforces the concept that recyclables are valuable material rather than garbage destined for a disposal facility; and - Local governments that own and operate MRFs will retain all material revenue, which can be significant if high-quality material is marketed with maximum value in mind.	- Amount of revenue is uncertain and varies since the tonnage and price received for recyclables is not guaranteed; - Local governments with a small amount of recyclables are limited in their negotiating power for good prices, unless they participate in a regional effort with neighboring local governments; - A processor may increase processing fees if they participate in a revenue sharing arrangement; and - Local government recycling coordinators must invest time in understanding what the markets are and how they operate.
Charging a Service Fee	- Can be tied to type of service; - Predictable source of revenue; - Usually more politically acceptable than a property assessment (which is viewed more like a tax); - Perceived as more equitable than millage taxes since the only people who pay the fee are customers receiving; and - Can encourage participation in a recycling program if structured properly.	- Non-payment may be more likely than with a property assessment; - May require cooperation with another service provider (e.g., utility company or department); - Can be more cumbersome to implement than property tax fees or millage, in the sense that utility bills are issued more frequently than property taxes; - May decrease participation in recycling depending on how it is structured; and - Isolates and draws attention to funds, thereby making them potentially more vulnerable to being used for other purposes.
Pay-As-You-Throw (PAYT)	- Provides a predictable revenue stream as long as a minimum, fixed level of service is required and enforced; - Revenue is generated before the funds are expended; - Typically more politically acceptable than an assessment (which is viewed more like a tax); - Viewed as an equitable fee system for solid waste collection and disposal; and - Proven to increase waste reduction and recycling, especially when collection is not optional and good programs are in place.	- Revenue varies depending on waste disposed of and may be lower than anticipated when collection service is not mandatory and when no minimum level of service is required; - Customers can perceive that a previously "free" service now has a cost attached; - Can be complicated to implement and administer especially if it requires a procurement and distribution system for containers, bags, tags or stickers and enforcement; and - Some local governments report short-term increases in illegal disposal when implemented, except where garbage collection is mandatory and ample composting and recycling programs exist.
Increasing Property Tax Millage Rates	- Can generate enough revenue to cover the cost of services to be funded; - Provides a predictable amount of revenue, thereby minimizing financial risk; - Can be set and varied by customer type; - Are tax deductible; - Is easier to administer than user fees; and - Has a high fee collection rate.	- Can be politically difficult; - Cost of providing garbage and recycling collection does not typically vary by residential property value, so wealthier residents tend to bear a higher burden; - May be difficult to set that equitably reflects various needs and services; - Tourists and renters do not pay millage directly, but benefit from the services; and - If the garbage/recycling millage is embedded in the general fund millage, then: - Residents may not know the true cost; and - The programs may have to compete with other programs and services to receive continued funding.

The following are actions to consider to help move the program towards long-term financial sustainability.

- **Define integrated solid waste management goals** relative to current programs. Create a vision statement to guide decision makers in analyzing current program effectiveness and establishing priorities;
- **Seek stakeholder input and support.** Identify all potential affected parties and involve them in the vision setting process and in defining needs and priorities. This includes elected officials and other leaders in local government;
- **Unbundle rates and fees.** This allows each program and service to be evaluated on its merits separately – an essential step for considering options to reduce costs and/or enhance services;
- **Analyze services, projected costs and revenues.** By identifying factors that may affect costs, decision makers and stakeholders will understand possible future requirements and the need for contingency plans;
- **Benchmark program costs and performance.** Determine costs and performance levels and compare them to similar programs in other local governments on an “apples-to-apples” basis;
- **Identify and analyze strategies to optimize system efficiency.** Any action that reduces cost or increases recycling tonnages will improve the system efficiency. While there is a cost involved in analyzing and adjusting, the cost of not doing so may be higher;
- **Establish clear criteria for evaluating options.** Qualitative and quantitative criteria that may be used in evaluating options include:
 1. Ability to cover all anticipated costs;
 2. Legal and administrative feasibility;
 3. Ability to provide incentives to increase recycling; and
 4. Allowing for adjustment in revenue;
- **Evaluate and rank options.** Attempt to objectively evaluate options and seek stakeholder input prior to asking decision makers to choose among them;
- **Develop a draft funding plan and obtain feedback.** The plan should include: the vision, goals and needs of the program; the option's evaluation methodology; estimated cost and revenue; methods for implementing cost cutting or revenue generating strategies; and implementation steps and time line. Provide all interested/affected parties an opportunity to review the draft strategy and provide feedback;
- **Finalize and implement the funding strategy.** Consider feedback from stakeholders, decision makers, elected officials and the solicitor. Finalize the strategy and begin implementation. It may be helpful to set interim milestones to maintain momentum; and
- **Track program costs and performance/ review periodically.** This step is necessary to evaluate how the program is functioning and the need for adjustments. Having the information will make any adjustments to funding programs more acceptable and may help to define opportunities for additional program enhancements.

Chapter 12: References & Resources

- Carolina Recycling Association - cra-recycle.org
- Clean River, Recycling Grants - cleanriver.com/blog/recycling-grants
- PalmettoPride - palmettopride.org
- The Recycling Partnership - recyclingpartnership.org
- Resource Recycling, Grant Watch - resource-recycling.com/recycling/grant-watch
- R.W. Beck (for the Pennsylvania Department of Environmental Protection), “Building Financially Sustainable Recycling programs: A Technical Report”, 2005 - files.dep.state.pa.us/Waste/Recycling/RecyclingPortalFiles/Documents/fin_sust_rec.pdf
- S.C. Department of Environmental Services - des.sc.gov
 - Grant Funding for Local Governments - des.sc.gov/local-government-recycling
 - Solid Waste Management Full-Cost Disclosure Regulation - des.sc.gov/laws-regulations/land-waste

Reporting



Importance of Maintaining Recycling Records

Maintaining records of your recycling program is important to sustain and improve the program. Records can help:

- **Provide feedback to those involved in the program** (e.g., haulers, residents, businesses, government leaders);
- **Provide feedback to local government leaders** regarding the benefits or costs of the programs;
- **Understand specific program enhancements** or outreach efforts;
- **Identify areas of the program that may benefit from improvement** or additional opportunities for waste reduction or recycling programs; and
- **Meet the state's reporting requirements.**

Reporting Data

The S.C. Department of Environmental Services (SCDES) uses an online program to collect residential, commercial, institutional, and industrial recycling efforts from counties.

Re-TRAC Connect does not require specialized software, simplifies the process of submitting data for the annual report, and allows users to generate charts and graphs, customize reports, and monitor progress and trends.

More about using Re-TRAC is provided later in this chapter.



Ideally, the data collected will provide local government leaders with information to assess how well waste reduction/recycling goals are being met.

Types of Recycling Data

Tracking the success of a program may require tracking many different types of data – as one “metric” rarely tells the complete story. For example, a reduction in overall tons recycled could be a result of reduced participation in recycling programs, a decline in population or an increase in source reduction efforts.

Similarly, an increase in tons of solid waste disposed of may at first seem like a negative reflection on a recycling program. If the city, however, experienced a significant increase in population or experienced a natural disaster (e.g., flood, hurricane, etc.), this would increase the amount of waste generated. There is also a positive relationship between economic health and waste generation.

QUANTITATIVE DATA

There are several types of quantitative data a local government can track, including:

- **Demographic Information**
 - The number of single-family homes;
 - The number of multi-family dwellings;
 - The number of industrial/commercial/institutional entities; and
 - Population of the community.
- **Tonnage Data**
 - Tons of waste disposed of (if possible, tracked by residential versus commercial); and
 - Tons of material recycled, by commodity or material type (and, if possible, tracked by residential versus commercial).

- **Cost and Revenue Information**

- The cost of recycling services (collection, processing, container purchase, rental, maintenance);
- Revenues received from the sale of recyclable material; and
- Disposal costs avoided due to recycling.

The recycling coordinator also may be involved in tracking quantitative data related to customer service and contractor compliance such as number of non-collections or complaints per month. It is advantageous to track quantitative data monthly so that the factors that influence the quantities (tons) of material collected and the cost of recycling that material can be better understood.

Data, for example, might be analyzed in the following ways:

- **By location** (e.g., by residential routes to understand which neighborhoods generate the most/least recyclables and/or have the highest/lowest set-out rates);
- **By material type, based on quantities processed/sold** by the local processor or material recovery facility (MRF). Also, a periodic review of the amount of potentially recyclable material still being disposed of in a landfill can be determined by a waste audit;
- **By month or season** (especially for areas that experience fluctuations due to tourist seasons);
- **By calendar or fiscal year**; and
- **Per capita**.

In many cases the local government may have to obtain quantitative data from private haulers or contracted service providers. It is advised to include specific reporting requirements in the service contract.

QUALITATIVE DATA

To help make more complete sense of the quantitative data gathered and to ensure that all pertinent information is captured, it is important to maintain qualitative information about the local government's recycling program such as:

- **Names and contact information of service providers for all recycling programs** including recyclers of "typical" material and also of special material – such as electronics,

grease, mattresses, shredded paper (from businesses) chemicals – household hazardous waste (HHW), carpet, etc.;

- **Material included in or added to recycling or diversion program** (e.g., addition of food waste to a composting program);
- **The number, types and location of curbside and drop-off collection containers** (if the local government owns them) – including lists and maps (bar codes and GIS systems are often used to map and inventory containers);
- **Changes to solid waste and recycling programs** (e.g., change to pay-as-you-throw solid waste collection or switch to single-stream recycling collection);
- **Implementation of waste reduction programs**;
- **Education/outreach efforts** (e.g., brochures, utility bill inserts, print media, TV and radio ads, specific recycling campaigns such as Earth Day or America Recycles Day, etc.);
- **Changes to recycling/sustainability plan or goals**;
- **Changes in staff/contracted service providers**;
- **Changes in contract terms**; and
- **New programs that would impact types and quantities of material generated** (e.g., a bottle bill or extended producer responsibility/take-back programs).

Best Management Practices for Using Databases

- **Keep the database as simple as possible** without comprising your data needs;
- **Use widely accepted software** – preferably software that can perform calculations on quantitative data;
- **Double check formulas**;
- **Enter data regularly**;
- **Back up files regularly**;
- **Train others** how to update data;
- **Label data units**; and
- **Indicate sources of data** and contact information for all data elements.

Documenting such information allows the recycling coordinator to determine the impact of changes on the performance of the recycling program by observing how metrics are affected by each change. In addition, the recycling coordinator might consider keeping a log of lessons learned and best management practices. Information regarding resources and contacts is also helpful information to maintain including notes to clarify the relationship and history of the contacts with the local government.

In some cases, the recycling coordinator may wish to conduct a resident/business survey to identify:

- **Knowledge about the program** (e.g., what residents understand can be recycled);
- **Attitudes about recycling or waste reduction activities** (e.g., the extent to which the respondent feels it helps the environment);
- **Perceived convenience of the program**; and
- **Barriers to participation** in recycling and/or waste reduction activities.

Conducting a survey may help the local government identify ways to improve its programs and increase the amount of material recovered. It may be possible to work with a local college or university to help administer the survey and evaluate the survey results. Several easy-to-use, no-cost online survey tools are available. Surveys are described more fully later in this chapter.

Full-Cost Determination & Reporting

The Act requires that all counties and municipalities that provide solid waste services document and make public the full costs of providing these services. Failure to comply with the full-cost disclosure requirement can result in ineligibility for a local government to apply for grants funded by SCDES.

Analyzing program costs and program performance levels is critical to determining potential changes to programs (e.g., expansions, adjustments to material accepted, need for new equipment, potential contracting or staffing changes, etc.). It also is important to evaluate potential changes in market conditions, labor, operational expenses and equipment costs that may affect future costs.

By identifying the factors that may affect costs, even if they cannot be accurately predicted, decision makers and stakeholders will understand possible future funding requirements and the need for contingency plans.

Analyzing revenues involves:

1. **Projecting funding that is available** from each current funding mechanism; and
2. **Identifying factors** that may affect fund availability.

As with costs, there are important areas of uncertainty in projecting revenues such as how market prices will respond to fluctuations in supply and demand by end-users. Again, it is important to identify and consider sources of uncertainty.

In addition to full-cost reporting, county governments (as well as state agencies and state-supported colleges and universities) are required to report recycling data annually to SCDES. Recycling data also is collected from municipalities, businesses and the recycling industry and allocated to the counties where the material was generated, but these entities are not required to report.

All data is collected on a fiscal year basis (July 1 to June 30) and is carefully vetted and combined with disposal data to calculate recycling and disposal rates for the state and individual counties. This information can be found in "The South Carolina Solid Waste Management Annual Report."

Counties and other entities submit recycling information to SCDES using Re-TRAC Connect - an online data management system that allows users to input, access and update their data at any time.

METRICS TO USE

A metric is a standard of measurement that can be used to quantitatively assess the local government's solid waste and recycling programs. Several different types of metrics can be used in order to gain an understanding of the effectiveness of waste reduction and recycling programs as well as the effectiveness of program changes, a specific outreach campaign or other educational efforts.

Five common metrics are described as follows.

1. **Recycling Rate** - The amount of material recycled relative to the total amount of waste generated. (The amount generated is determined by adding tons of material recycled plus tons of waste disposed of.) Recycling rates are calculated using the following formula.

$$\frac{\text{Tons of Waste Recycled}}{\text{Tons of Waste Recycled} + \text{Tons of Waste Disposed Of}}$$

2. **Set-Out Rate** - The number of set outs (i.e., bins/carts on the curb) relative to the total number of eligible stops on a route. In some cases small businesses are also included in the route and would be part of this metric.

$$\frac{\text{No. of Households/ Businesses Setting Out Recycling Bins or Carts} \times 100}{\text{Total Number of Eligible Stops}}$$

Set-out rates are usually calculated on a route-by-route basis and the information can be added to calculate a total set-out rate.

EXAMPLE: On a collection route, 450 set outs were counted and collected. The total number of eligible stops is 700. The set out rate = $450/700 = 64$ percent.

3. **Participation Rate** - The proportion of those that participate in a program on a regular basis relative to the number of potential participants.

$$\frac{\text{Number of Stops that Set Out at Least Once Per Specified Time Period} \times 100}{\text{Total Number of Eligible Stops on a Route}}$$

EXAMPLE: Six hundred identifiable stops locations place set outs at least once per month. The total number of eligible stops is 700. Participation rate = $600/700 = 86$ percent. The key to determining an accurate participation rate is to define the observation time period (it should be no more than four weeks) and correctly link set outs to specific

addresses. Participation rates in communities are typically measured on a per-household or per-account (if small businesses are included in the program) basis.

4. **Total Pounds Recycled Per Capita** - This measures the average per-capita tons (or pounds) generated in a certain time period (e.g., annually, monthly, daily). Calculate total pounds recycled per capita using this formula.

$$\frac{\text{Total Pounds Recycled}}{\text{Total Population of Area}}$$

5. **Total Pounds Disposed of Per Capita** - This measures the average amount of waste each person disposed of in a certain time period (e.g., annually, monthly, daily). Estimate total pounds disposed of per capita using this formula.

$$\frac{\text{Total Pound Disposed}}{\text{Total Population of Area}}$$

Other metrics may be geared to understanding the net costs of the recycling program. Net costs are the total costs of the program minus the income from the program (such as revenue from the sale of recyclable material). To be accurate, all costs should be accounted for such as direct costs (e.g., labor, transportation, processing, container costs, education and outreach programs) as well as indirect costs.

Indirect costs are more challenging to estimate and include administrative and overhead costs such as the costs incurred by procurement staff to select vendors and equipment as well as administrative costs associated with paying service providers, record keeping, etc.

Costs are often examined on a per-ton basis, but it is often helpful to examine them on a per-household (or per account) basis. It also can help to compare the net cost of the recycling program (on a dollar-per-ton basis) to the cost of disposing of the same amount of material.

In some parts of the country (e.g., where tipping fees are high), this metric shows the fiscal reward of recycling.

About Re-TRAC

The Act requires counties to submit annual progress reports to SCDES pertaining to the disposal of solid waste and recycling during fiscal years. State agencies and state-supported colleges/universities are required to maintain recycling programs and report recycling activities yearly. Businesses are not legally required to report but are heavily encouraged to report and have influence on county recycling percentages.

To obtain this information, SCDES opens several solid waste management annual surveys to local governments that solicit information about residential, commercial, institutional and industrial recycling efforts in the county.

The Office uses an online data reporting and management system called Re-TRAC Connect to record the information. This program simplifies the process of submitting data for the annual report, allows users to readily generate charts and graphs and



lets users customize reports so they can monitor progress and trends.

Below is a list of reports in Re-TRAC.

- **Annual Local Government Survey**
- **Earned Revenue Survey** (may not be applicable to every county)
- **Full Cost Disclosure Report**
- **Residential Recycling Information**
- **Recycling Efforts of Commercial Business/ Industry Survey**
 - Commercial/Institutional Material Information
 - Industrial (Office/Packaging) Material Information
 - Industrial (Processing/Manufacturing) Material Information

Below is a list of commonly recycled commodities, broken down into categories. Please note, not all programs accept all commodities. Counties should report what is accepted within the individual programs.

Chapter 13: References & Resources

- ASTM International, Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste - astm.org/Standards/D5231.htm
- Re-TRAC Connect - connect.re-trac.com
- S.C. Solid Waste Policy and Management Act - scstatehouse.gov/code/t44co96.php
- S.C. Department of Environmental Services - des.sc.gov
 - S.C. Solid Waste Management Full-Cost Disclosure Report - des.sc.gov/sites/des/files/Library/D-1409.pdf
 - S.C. Solid Waste Management Regulations - des.sc.gov/permits-regulations/laws-regulations-regulatory-updates/scdes-laws-and-regulations-land-waste-management
- U.S. Census, QuickFacts (Population by City and County, SC) - census.gov/quickfacts/SC
- U.S. Environmental Protection Agency - epa.gov
 - Waste Reduction Model (WARM) - epa.gov/warm

TRADITIONAL COMMODITIES ACCEPTED

Commingled Recyclables	Banned Items
Glass	Miscellaneous
Metal	Organics
Paper	C&D Debris
Plastic	Reuse

Within these commodities are certain materials that are banned from the landfill and must be recycled.

COMMODITIES BANNED FROM DISPOSAL

Tires	Electronics
Used Oil	White Goods (Appliances)
Lead-Acid Batteries	

Re-TRAC Connect is a web-based program that does not require specialized software to be installed on the user's computer but requires an account be created in order to enter the data. If you need access, contact the Office or visit <https://connect.re-trac.com/login> to set up an account.

What to Include in a County/Regional Solid Waste Management Plan



CHAPTER 14

Counties or regions are required by the S.C. Solid Waste Policy and Management Act (Act) (Section 44-96-80) to have a solid waste management plan. The plan must be consistent with the S.C. Solid Waste Management Plan (State Plan) – which is mandated in the Act as the responsibility of the S.C. Department of Environmental Services (SCDES).

Plans must provide for the management of:

1. **Existing solid waste streams;**
2. **Projected solid waste streams;** and
3. **Potential solid waste streams** through a combination of reduction, recycling, disposal, and other treatment options for a 20-year period.

Each county, town, and city located within the county or region must be included in the plan.

The Act prioritizes waste reduction and recycling over disposal. Each plan should include a description of the program that is designed to meet South Carolina's recycling and waste reduction goals. Finally, each plan must be submitted to SCDES for approval.

Here are additional key takeaways of the legislation. Each plan must cover a 20-year period and include:

- **An estimate of the amount of solid waste disposed of** at facilities within the county or region and the capacity to manage that waste;
- **An analysis of the existing and new solid waste facilities** that will be needed to manage the solid waste generated within that county or region;
- **A description of each solid waste stream** the county or region manages or could potentially manage to include all of the management options for each stream;
- **A description of the education/outreach program** to inform the public on the benefits of waste reduction and recycling as well as the requirements of the recycling program;
- **An estimate of the cost to implement the plan** including the siting, constructing, and bringing into operation any new facilities needed to manage solid waste; and
- **The designation of a recycling coordinator** and description of duties.

Assessing the Program's Progress Toward Reaching State Goals

Recycling coordinators are encouraged to evaluate the progress of their programs in meeting South Carolina's 50 percent by 2030 municipal solid waste (MSW) recycling goal. This can be done in three steps.

1. Determine the total amount of MSW generated: Tons MSW disposed of + tons MSW recycled.
2. Multiply tons of MSW generated by 0.50 (i.e., 50 percent). The result represents the amount of MSW that needs to be diverted to meet the state's recycling goal.
3. Compare the tons recycled to the goal. Try to estimate the portion of recyclables collected that were disposed of because they were contamination or residue. The MRF will be able to provide you with an average contamination/residue rate.

Here are the steps to calculate progress towards the state's waste reduction goal – 3.25 pounds per person per day.

1. Take the amount of MSW disposed in the past fiscal year. This likely will be in tons. Convert this number to pounds by multiplying it by 2,000.
2. Divide that number by the number by the county's population to determine total disposal per person per year. Then divide that number by 365 to determine daily per capita disposal rate.

Consideration for Your Solid Waste Management Plan

A solid waste management plan is a strategic roadmap for the safe, efficient, and cost-effective handling of waste. The plan includes many parts including assessing the waste stream, identifying infrastructure need and recycling markets, detailing procedures for the collection and transportation, funding, and more. It also highlights supporting elements such as community engagement and education/outreach initiatives essential to make the plan successful.

In South Carolina waste reduction, recycling, and composting are priorities over disposal and as such plans should be designed to maximize diversion of waste.

With that starting point, here are some general thoughts for county or regional governments to consider when updating their plan.

- **A Vision Statement** – This declaration focuses on the long-term goals of the county's solid waste management program and serves a compass for long-term strategic

planning, policy development, and decision making. EXAMPLE: The County's goals are to become South Carolina's leader in sustainable material management.

- **Goals** – South Carolina has established waste reduction and recycling goals as well as a food waste reduction goal and county or regional programs are expected to meet the goals. The plan should include an acknowledgment of that expectation.
- **Gap Analysis** – This process evaluates the current solid waste management program (e.g., existing operations, infrastructure, technologies, policies) in comparison to the standards and success of other programs. The goal of a gap analysis is to identify shortcomings or gaps that inhibit the program from being more effective and efficient.
- **Continuous Improvement** – This is an ongoing process of making small or significant changes to improve services, program efficiency, and achieve better outcomes (e.g., improved recycling rate).

U.S. EPA Tools For Tracking

The U.S. Environmental Protection Agency (U.S. EPA) has several tools that can help track progress in waste reduction and recycling and present data in an interesting, meaningful way. These tools may be helpful in looking at community programs and also may be recommended to businesses to evaluate their progress.

WASTE REDUCTION MODEL (WARM)

To some, recycling a specific quantity of material may have little meaning. More than ever, many people are in tune with greenhouse gas (GHG) emissions and climate change. Recycling coordinators can translate a community's recycling success into output that appeals to this audience using the U.S. EPA Waste Reduction Model (WARM) – available at epa.gov/warm.

Output from WARM can be entered into U.S. EPA's GHG Equivalencies Calculator – available at epa.gov/energy/greenhouse-gas-equivalencies-calculator. The resulting

output can be expressed in terms that are more readily understood. For example, results can be translated into:

- Annual emissions from number of passenger vehicles;
- CO₂ emissions from the consumption of number of gallons of gasoline;
- CO₂ emissions from the electricity use from number of homes for one year;
- Carbon sequestered annually by number of acres of pine forest; or
- CO₂ emissions from number of propane tanks from home barbecues.

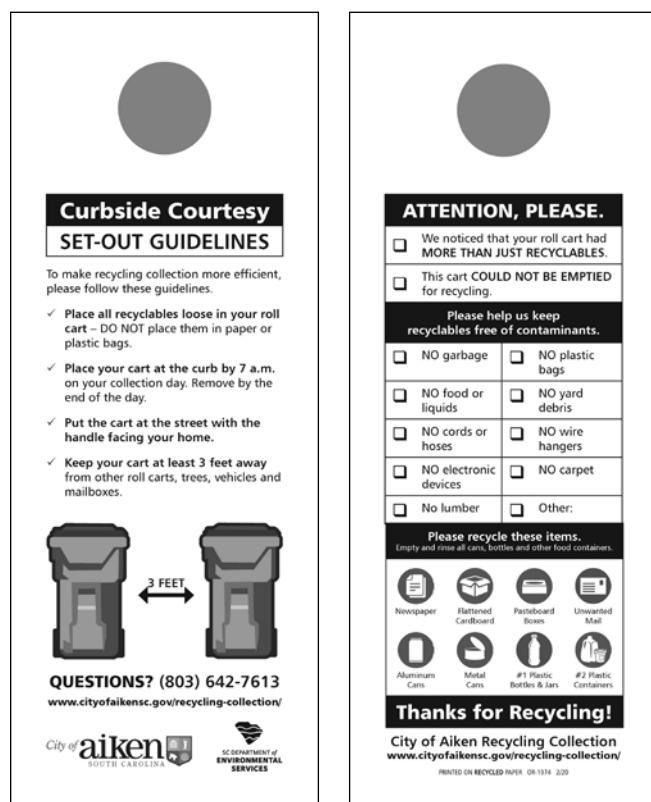
Auditing Program Performance

Whether recycling collection is provided by a private hauler, a local government, or in an open system by multiple private haulers (which is more challenging, but still possible), the recycling coordinator can gain insights about the program by auditing recycling collection operations.

For curbside operations, this means regularly riding in or following collection trucks and/or visiting neighborhoods immediately prior to and following their recycling pickup.

Auditing performance will help to determine:

- **If the hauler is careful to return the bins/carts properly;**
- **If the hauler is careful not to allow material to become windblown;**
- **If the hauler is mixing recyclables with garbage;**
- **If the hauler is collecting all of the acceptable material and leaving contaminants with an “oops” tag, if appropriate;**



An “Oops” Tag Used by the City of Aiken

- **If residents are contaminating recyclables with trash;** and
- **How many households recycle.**

Similarly, auditing recycling drop-off sites (including those at multi-family dwellings) can be done any time. These visits will help determine:

- **If collection is frequent enough or too frequent** (i.e., how full are the containers at collection time?);
- **If the collection area is adequately maintained** and, if not, whether this is due to careless service or residents abusing it;
- **If there are contamination issues that need to be addressed;**
- **If the site is adequately secure and easy to use** (e.g., lighting after dark if the facility is available 24 hours);
- **If drop-site attendants are performing their jobs adequately;** and
- **If containers are properly placed.**

Additional information about the community recycling program (or an individual institution or business’s program) can be obtained by conducting the following additional steps.

- **Inspection of Waste** – Recycling professionals can inspect the waste collected from residential curbside routes or dumpsters placed at multi-family dwellings and convenience sites. Inspections can be relatively quick (e.g., selecting bags to break open and visually inspecting their contents) or more involved (e.g., sorting the waste disposed of at the landfill or disposal facility into specific categories and weighing it), but a checklist or documentation process of some sort is necessary.

The inspection can help the recycling coordinator:

- Identify additional items that could potentially be targeted for recycling;
- Identify material that can be recycled but is frequently disposed of, to include in targeted education/outreach campaigns; and
- Identify specific collection routes and/or multi-family residences that may benefit from additional education/ outreach.

- **Review of Hauler Data** – The regular provision of data must be written into any contract for recycling collection whether curbside, drop-off or multi-family. Obtaining data regarding the amount of material recycled under an open system is more complicated, but an enforceable ordinance or licensing requirement can motivate hauler cooperation, especially if confidentiality is respected and data reporting forms are easy to complete. Such data should be reviewed consistently, considering seasonality, so that any deviations can be addressed.
- **Surveys** – Recycling coordinators can survey residents to gauge the success of their efforts as well as identify areas for improvement. Potential survey questions are listed below.
 - If you don't participate in the recycling program, why not?
 - Are there aspects of the program that are confusing?
 - Is the service adequate (i.e., curbside frequency, timing, etc.)?
 - Are bins/containers of adequate size and in good condition?

Surveys can be advertised and/or conducted through the newspaper, the local government's website, a utility bill or in person at recycling drop-off sites. Online surveys are a cost-effective way of obtaining information. Some communities conduct telephone surveys. To encourage participation in a survey, a prize drawing can be offered.

The recycling coordinator might also find it useful to survey businesses and institutions to identify their barriers to recycling and material they find challenging to recycle.

Chapter 14: References & Resources

- Re-TRAC Connect - connect.re-trac.com
- S.C. Solid Waste Policy and Management Act - scstatehouse.gov/code/t44co96.php
- S.C. Department of Environmental Services - des.sc.gov
 - S.C. Solid Waste Management Full-Cost Disclosure Report - des.sc.gov/sites/des/files/Library/D-1409.pdf
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 - Solid Waste and Recycling Reports - des.sc.gov/community/recycling-waste-reduction/solid-waste-and-recycling-reports
- U.S. Census, QuickFacts (Population by City and County, SC) - census.gov/quickfacts/SC
- U.S. Environmental Protection Agency - epa.gov
 - GHG Equivalencies Calculator - epa.gov/energy/greenhouse-gas-equivalencies-calculator
 - Waste Reduction Model (WARM) - epa.gov/warm
 - U.S. EPA's Greenhouse Gas Equivalencies Calculator, epa.gov/energy/greenhouse-gas-equivalencies-calculator



Policies That Support Recycling

Local Policies

PAY-AS-YOU-THROW (PAYT)

PAYT (also called SMART – Save More and Reduce Trash, unit-based pricing, or volume-based pricing) is a policy in which residents are charged by the amount of trash they dispose. This is in comparison to flat-fee pricing, in which all households pay the same amount regardless of how much waste they generate.

PAYT programs are generally set up so the cost of recycling is included in the trash collection/disposal costs. Municipalities charge households based on garbage cart size or per trash bag. Bags therefore must be pre-paid (usually with a municipal logo/of a unique color to help ensure compliance) or have a pre-paid tag. Alternatively, a hybrid program could include a base-level cart for a base fee (which would include the cost of curbside recycling), and households would pay extra for a larger garbage cart. Benefits of PAYT include:

- **Households that generate less trash pay less**, which enhances equity;
- **Households have an economic incentive** to maximize recycling and composting;
- **Municipalities/haulers reduce waste collection and disposal costs.**

Local governments across the country implement municipal PAYT programs and many have contract agreements or hauler licensing/registration requirements that oblige haulers to charge customers based on a volume-based pricing scheme. Massachusetts provides grants to local governments to help them implement PAYT programs. There are thousands of PAYT programs among 47 states in the United States. Some of the largest PAYT programs include San Francisco, California, and Portland, Oregon. No communities are known to implement PAYT in South Carolina, although several communities charge residents for an extra garbage cart.

MANDATORY SERVICE PROVISION/COMBINED SERVICE PRICING/CONVENIENCE STANDARDS

Some local governments encourage residents to recycle by ensuring that haulers that provide garbage collection service also provide recycling services. This is called mandatory provision

of service. Often state laws and local ordinances that require this also require the cost of recycling collection to be included in the cost of solid waste collection. This is in comparison to communities that charge households an additional fee to recycle.

This policy can be adopted by local governments that collect garbage and recycling with municipal crews, or implemented as part of a contract or franchise agreement with a contracted service provider, as or part of a licensing/registration requirement for all haulers operating in the district. Communities also may include a convenience standard which stipulates that collection of recyclables must be as convenient and frequent as garbage collection. The requirements may apply to residential curbside service, residential drop-off service, multi-family dwelling service, and commercial service as well as to all public spaces such as parks, municipal buildings, and public events.

A related requirement is stipulating in the building ordinances the amount of space that must be allocated to recycling containers at commercial and multi-family complexes. This helps address one barrier to recycling – space constraints. California has implemented this requirement statewide, and many local governments have adopted their own ordinances with specific space and enclosure requirements that go beyond state requirements.

Stopwaste.org has developed a guidance document to help designers of commercial and multi-family dwellings ensure adequate space exists for waste diversion.

State-Level Policies

DISPOSAL BANS

Many state governments (and sometimes local governments, particularly if they own a landfill) ban the disposal of certain items from disposal. This may be because the material presents hazards in the landfill or causes environmental or operational issues. Some states (e.g., Wisconsin, Massachusetts, Minnesota, North Carolina, Michigan) have banned the disposal of

certain recyclable materials to help incentivize the recycling or composting of them. In North Carolina, for example, plastic beverage bottles and aluminum cans are banned from landfill (among many other items).

In order for this policy to be effective, landfill staff must be properly trained to spot these items (which works best for larger, more visible items, such as mattresses). If a state law, the state environmental agency must conduct audits to identify and educate offenders and enforce the ban. Landfill bans are most effective when they are announced well in advance of their implementation. This not only helps ensure generators and haulers are aware of the ban, but also allows time for recycling systems to be developed, if needed.

In South Carolina the disposal of whole tires, used motor oil and oil filters, large appliances, electronics, and rechargeable batteries are banned from landfills. Additionally, yard trimmings are banned from disposal in Class 3 landfills.

LANDFILL DISPOSAL SURCHARGES

Many states impose a per-ton fee, tax, or surcharge on disposed waste. This fee is in addition to the tipping fee. Then, it is remitted to the state and used to help fund solid waste management programs, including recycling programs. In some cases, part of the fee helps fund other environmental programs. Charging the fee on waste being disposed of, but not recycled, helps discourage disposal and encourage recycling.

DEPOSIT RETURN SYSTEMS

Deposit return systems (DRS) for beverage containers have been in place in some U.S. states for decades. Also referred to as “bottle bills,” these programs provide a financial incentive for consumers to return covered beverage containers to retail or a redemption center to receive a deposit return. This increases the recycling and reduces the litter rate of these materials. Such programs are enabled by state law. Currently 10 states in the United States have a DRS in place. They include California, Connecticut, Hawaii, Iowa, Maine, Massachusetts, Michigan, New York, Oregon, and Vermont.

The Container Manufacturing Institute (CMI) indicates that states with a DRS have much

higher recycling rates for covered materials than non bottle-bill states. States with a higher deposit (i.e., Michigan, Connecticut, Oregon) achieve higher return rates due to a stronger financial incentive. Material collected through these programs also is less contaminated than material collected curbside and is often of higher value to end markets.

How Deposit Return Systems Work

1. Retailers provide deposits to beverage distributors when they receive a delivery of beverages to the store.
2. The consumer pays the retailer the deposit when they purchase the beverage.
3. The consumer receives the deposit back from the retailer, reverse-vending machine, or redemption center when they return the empty container.
4. The distributor or distributor cooperative pays the deposit to the retailer/redemption center (plus a handling fee) and arranges for pickup and recycling of returned containers.

WHO KEEPS THE REVENUE FROM THE SALE OF RECOVERED MATERIALS?

In most states a recycler collects, bales, and markets the recovered beverage containers under contract with the beverage distributor/distributor cooperative. Revenues are generally used to offset the costs of the system.

WHAT IF THE BOTTLE IS NOT RETURNED?

If the bottle is not returned, there is an “unredeemed deposit.” In most states unredeemed deposits are retained by the bottlers/distributors. In some states (including California and Hawaii), they revert to the state which uses the funds to administer the program. In Massachusetts and Michigan, the state receives the funds and uses them for environmental programs.

SOURCE: Based on information provided by the Container Recycling Institute, bottlebill.org/index.php/about-bottle-bills/what-is-a-bottle-bill

Modern bottle deposit systems have tried to build in convenience by having reverse-vending machines as well as bulk drop-off systems. By using them, consumers do not have to wait for their refund, but receive a deposit after the center has processed their tagged bag. These systems are explained in detail below.

ADVANCE RECYCLING FEE

Many states, often in combination with landfill bans, place an advance recycling fee (ARF) on certain material types, especially items known to be challenging to recycle. The fee is paid upon the purchase of the item and pays for its recycling at the end of its useful life. If implemented properly, the fee should ensure that generators of the item (e.g., tires, lead-acid batteries, mattresses) are recycled properly, in comparison to charging a generator to recycle the item at the end of its useful life - which can result in illegal disposal.

The implementation of an ARF is enabled by state law. In some states laws have been implemented requiring producers of certain product types to implement recycling programs for certain products at the end of their useful life. Often these industry-led programs are funded via ARFs.

In order for ARFs to be successful:

- **Fees must be sufficient to cover the cost of managing the material**, including transportation, processing, education, and outreach as well as any collection/processing infrastructure enhancements and market development required and associated administrative costs;
- **There must be ample convenient locations** (supported by statute) where the material is accepted for recycling - ideally where the item is sold. It is mandatory to accept for recycling (as is the case with tires in South Carolina and many other states);
- **Consumers must be made aware of these programs**;
- **Enabling laws must have adequate penalty and enforcement mechanisms in place**, as well as requirements for recycling; and
- **There must be adequate demand/end markets** for these materials.

As is described in Chapter 5, in South Carolina there are ARFs on tires, lead-acid batteries, and large appliances.

Advance fees can fund state agency-led programs or producer-led recycling programs.

Examples include the following.

- **PaintCare** was created by paint manufacturers and the American Coatings Association to manage leftover architectural paint in states with stewardship laws (12 states plus Washington, DC). PaintCare is funded by a fee (the PaintCare fee) added to the purchase price of new paint in participating states. This fee typically ranges from \$0.30 to \$2.75 depending upon the container size and state. PaintCare establishes convenient drop-off locations at paint and hardware stores and government-run waste facilities.
- **Mattress Recycling Council (MRC)** is a nonprofit organization created by the International Sleep Products Association (ISPA) to develop and implement statewide mattress recycling programs for states that have enacted mattress recycling laws. It provides resources, education, and support for programs in California, Connecticut, Oregon, and Rhode Island. The program is funded by advance fees charged upon the sale of a mattress. These fees range from \$16 to \$22.50, depending upon the state.
- **Some Electronics Recycling Programs** - California's electronics recycling program is funded through an ARF charged to consumers when purchasing certain electronic products. Fees range from \$4 to \$6, depending upon device's screen size.

Product Stewardship/Extended Producer Responsibility

Product stewardship is the act of minimizing the health, safety, environmental, and social impacts of a product and its packaging throughout all lifecycle stages, while also maximizing economic benefits. The manufacturer, or producer, of the product has the greatest ability to minimize adverse impacts, but other stakeholders (e.g., suppliers, retailers, consumers) also play a role.

Stewardship can be either voluntary or required by law. Historically, product stewardship programs tend to focus on hard-to-manage materials (e.g., batteries, carpet, electronics, mercury thermostats, mercury switches, motor oil, paint, pharmaceuticals/sharps, pesticides).

Extended producer responsibility (EPR) is a mandatory type of product stewardship required by law. It includes, at a minimum, the requirement that the manufacturer's responsibility for its product extends to post-consumer management of that product and its packaging.

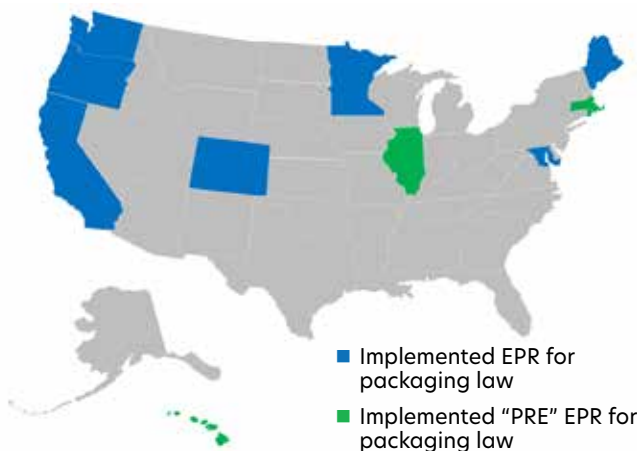
There are two related features of the EPR policy:

1. **Shifting financial and/or management responsibility**, with government oversight, upstream to the producer and away from the public sector; and
2. **Providing incentives to manufacturers** to incorporate environmental considerations into the design of their products and packaging.

Product stewardship levels the playing field among competitors and incentivizes environmentally conscious design. In South Carolina an extended product stewardship program is in place for household electronics and a voluntary producer stewardship program is in place for mercury-containing thermostats.

In the past few years, several U.S. states have implemented laws to require producers of certain goods sold into the state to pay for the recycling of that packaging at the end of its useful life. This is accomplished through an EPR for packaging. One or more producer-led organizations will operate the recycling programs in most states. Broadly, the goals of EPR for packaging laws include:

1. **Expand convenient access** to packaging recycling to all consumers;
2. **Broaden the array of packaging types** that can be recycled, and improve recycling effectiveness and efficiency;
3. **Encourage producers** to use more sustainable packaging;
4. **Ensure recovered packaging is being recycled responsibly**; and
5. **Encourage residents to recycle more and properly** to reduce contamination in the recycling stream.



EPR for packaging has been in place in several European nations, Canadian provinces, and some Latin American countries for several years. To date EPR for packaging laws have been passed by seven states. Several other states have passed "pre-EPR" laws, which typically require the development of a multi-stakeholder advisory council and call for a needs-assessment study. Some also call for selection/formation of a producer responsibility organization to manage the program.

The map and Table 15.1 below show the states with EPR and Pre-EPR laws in place.

Recycled-Content Requirements

Several U.S. states have implemented laws requiring the use of recycled content in certain materials, particularly in plastic packaging and products. Table 15.1 below provides a broad summary of these laws. The requirements are intended to drive demand for the recovered material, thus strengthening recycling.

Additionally, EPR laws for packaging encourage the use of recycled content. Some states also include recycled-content requirements for paper bags (or for multiple use plastic/textile bags) as part of their plastic carryout bag ban laws. It should be noted that state laws do not necessarily increase demand for the

Table 15.1: Recycled-Content Requirements by State

STATE	RECYCLED-CONTENT REQUIREMENTS
California	• Rigid plastic containers used for packaging • Trash bags • Certain textiles • Plastic beverage containers included in California's beverage deposit law
Maine	• Plastic beverage containers
New Jersey	• Rigid plastic containers • Plastic beverage containers • Plastic containers for other specified product types • Plastic trash bags • Plastic carryout bags • Glass containers • Paper carryout bags
Washington	• Plastic beverage bottles • Plastic household cleaning and personal care product containers • Plastic dairy containers • Plastic wine containers • Plastic trash bags

recovered material in that particular stat. Much depends upon where products and packaging are manufactured/filled and supply chains for manufacturers.

Environmentally Preferable Purchasing

Many states and local governments have environmentally preferable purchasing (EPP) policies in place, which encourage governmental entities to buy products with preferable environmental attributes. Such policies that support recycling include buying products:

1. **Made from recycled content** (usually post-consumer recycled content is specified); and
2. **That are recyclable** or in recyclable packaging.

EPP policies also may encourage the purchase of less toxic products, longer-lasting products, products made from sustainable resources, products with reduced or no packaging, and products that can be repaired or replaced in part when needed. EPP policies may require agencies to purchase a certain percentage of their supplies using EPP criteria, or to do so when possible, or when the price of environmentally preferable products does not exceed the price of other products by more than a certain percentage (i.e., the price preference).

South Carolina's EPP Policy

The state's EPP policy – developed by the SCDES's Office of Solid Waste Reduction and Recycling (Office), SCFAA Procurement and others – was officially unveiled in October 2009. The mission of the policy is to reduce the environmental and human health impacts of state government operations by integrating environmental considerations into its procurement process. While the initiative does not directly apply to local governments, the policy and supporting standards may assist in reducing the environmental impact of their purchases and serve as a model for developing local policies. The state procurement guidelines apply to all state government agencies and publicly funded colleges and universities. Among other things, it requires that:

- **Purchases consider long-term durability**, including analyzing short-term and long-term cost implications, and seeking reusable, refillable, and durable options.
- **Seek minimal packaging and packaging that can be reused, recycled, or composted** in existing systems.
- **Require outdated and non-functioning electronic equipment to be recycled.** Consider state contracts for leasing equipment that includes recycling at the end of its useful life.

U.S. EPA Comprehensive Procurement Guideline (CPG) Program

The Comprehensive Procurement Guideline (CPG) program is part of the U.S. Environmental Protection Agency's (U.S. EPA) continuing effort to promote the use of recycled material. While directed primarily at executive branch government agencies, CPG information is helpful to anyone interested in purchasing recycled-content products.

The CPG designates items in the following eight product categories:

1. **Paper and paper products;**
2. **Non-paper office supplies;**
3. **Vehicular;**
4. **Transportation;**
5. **Construction;**
6. **Landscaping;**
7. **Park and recreation;** and
8. **Miscellaneous.**

Under RCRA, the requirement to purchase an U.S. EPA-designated product containing recovered material applies to "procuring agencies" that spend more than \$10,000 a year on that item. Procuring agencies include all federal, state and local agencies or government contractors that use appropriated federal funds.

See "Chapter 15: References & Resources" under GREEN PURCHASING for more information about the program. The Product Resource Guides help describe the EPP available and their benefits. The CPG Supplier Directory can help interested parties locate EPP.

- **Apply a 7.5 percent price preference for goods made with recycled content** (this means the product can be up to 7.5 percent higher in price than a comparable good without recycled content).
- **Specify and purchase products with the highest practicable recycled content**, but no less than what the U.S. EPA considers the minimum (through their CPG Program).
- **Specify that all printed materials be on recycled-content paper.** Include a statement

on the printed item describing the percent recycled content that it contains.

- **Specify and purchase recycled-content transportation products** (e.g., signs, traffic cones, barricades, parking stops, delineators).
- **Specify the use of recycled, reusable, or reground materials** for paved construction projects.

The guidelines also call for many green building, green landscaping, and pollution prevention/toxic reduction efforts.

References & Resources for Chapter 15

DISPOSAL BAN RESOURCES

- Bottle Bill Resource Guide provides data and details about specific programs in the United States and beyond. A project of the CRI – bottlebill.org
- CalRecycle Electronics Waste Management Program – calrecycle.ca.gov/electronics/
- Circular Action Alliance (EPR for packaging) – circularactionalliance.org
- Deposit Return Systems for Beverage Containers, Container Recycling Institute (CRI) – provides information and studies about bottle bills – container-recycling.org
- Massachusetts DEP, “Waste Disposal Bans” – mass.gov/guides/massdep-waste-disposal-bans
- Mattress Recycling Council – byebyemattress.com
- PaintCare – paintcare.org

ENVIRONMENTALLY PREFERRED PURCHASING

- CPG Supplier Directory – epa.gov/smm/comprehensive-procurement-guideline-cpg-program#directory
- Green Purchasing Policy – https://procurement.sc.gov/files/2009-1_0.pdf
- Product Resource Guides – epa.gov/smm/product-resource-guides-comprehensive-procurement-guideline-cpg-program
- South Carolina Office of State Procurement: “Green Purchasing” – procurement.sc.gov/osp/green
- U.S. EPA: Comprehensive Procurement Guideline (CPG) Program – epa.gov/smm/comprehensive-procurement-guideline-cpg-program

PAYT RESOURCES

- Connecticut Department of Energy and Environmental Protection (CT DEEP), “SMART Resources” (includes overview of PAYT, tool kit, and case studies) – portal.ct.gov/deep/reduce-reuse-recycle/payt/save-money-and-reduce-trash
- Massachusetts DEP PAYT Resources (Implementation guide, fact sheet, more) – mass.gov/lists/pay-as-you-throw-payt – Includes a PAYT implementation guide

and a fact sheet for municipalities, slides and a webinar about PAYT, and results of PAYT programs.

- NHRecycles.org, “PAYT Toolkit” – nhrecycles.org/waste-diversion-reduction-toolkits/pay-you-throw-toolkit

PRODUCT STEWARDSHIP RESOURCES/ADVANCE RECYCLING FEES

- Product Stewardship Institute – Productstewardship.us

RECYCLED-CONTENT LAWS

- CalRecycle, “California’s Rigid Plastic Packaging Container (RPPC) Program” – calrecycle.ca.gov/plastics/rppc/
- CalRecycle, “Plastic Minimum Content Standards and Reporting for Beverage Manufacturer” – calrecycle.ca.gov/bevcontainer/bevdismant/plasticcontent/
- CalRecycle, “Recycled Content Trash Bag Program” – calrecycle.ca.gov/buyrecycled/trashbags/
- Maine Department of Environmental Protection, “Post-consumer Recycled Plastic Content in Plastic Beverage Containers” – maine.gov/dep/waste/recycle/pcr.html
- New Jersey Department of Environmental Protection (NJDEP), Division of Sustainable Waste Management, “New Jersey’s Recycled Content Law” – dep.nj.gov/dshw/swpl/recycled-content/
- Washington Department of Ecology, “Products Required to Meet Recycled Content Minimums” – ecology.wa.gov/regulations-permits/guidance-technical-assistance/recycled-content-products

SPACE REQUIREMENTS FOR WASTE DIVERSION GUIDANCE

- Space Guidelines for Recycling, Organics and Refuse Service – guides.stopwaste.org/building-guidelines/the-basic-rule-for-waste-diversion-planning
- Space Requirements for Waste Diversion Guidance, Stopwaste.org, “Space Guidelines for Recycling, Organics and Refuse Services” – stopwaste.org/sites/default/files/Building-Guidelines-Final-Apr8.pdf

Public Education & Promotion

Recycling Coordinator's Role

Recycling coordinators understand the benefits of waste reduction and recycling while recognizing that the public may not. Recycling and waste reduction are typically not the primary concern of residents, businesses, and institutions.

Recycling coordinators can increase recycling program support through:

- **Promotion** - Making the public aware that recycling services are available and providing details about the program. Promotion also includes encouragement to use the program and provide examples of how to reduce waste.
- **Instruction** - Directing the public to take specific actions to participate correctly in recycling programs and to reduce waste.
- **Education** - Educating residents about the benefits of recycling and reducing waste in a larger sense, connecting recycling to the community, and providing information on the impact of recycling and waste reduction on human health as well as the environment and economy. The S.C. Department of Environmental Services' (SCDES) recycling website (des.sc.gov/recycle) provides information about the environmental, economic, and energy benefits

of recycling and directs the reader to websites that provide information about specific communities' programs.

Promotion, instruction, and education are all important aspects of a communications strategy with the overarching goal of motivating individuals to take a particular action and sustain that new behavior until it becomes a habit.

The Value & Impact of Promotion & Education

Both the public and the private sector have invested significantly in recycling infrastructure (from collection to markets) and their continued existence and growth depend on the voluntary participation of residents. Public education is vital to encouraging individuals to recycle and reduce waste, and helping them understand:

- **What can be recycled;**
- **How to prepare material for recycling;** and
- **How to reduce their waste.**

Education efforts are particularly important when changes are made to a program or special services are offered (e.g., household hazardous waste collection events).



The City of Rock Hill wrapped a recycling truck with Recycling's Dirty Dozen. The truck now has two purposes: 1) a collection vehicle; and 2) a traveling billboard.

In return, effective public education and promotion should result in:

- **Increased participation** in the program; and
- **Reduced contamination** resulting in better material quality.

These benefits in turn improve the cost-effectiveness of the recycling program. Well-designed and implemented public education efforts can enhance public support for local recycling programs by developing a sense that recycling and waste reduction is the norm.

Best Practices in Promotion & Education Programs

Successful education and outreach programs include:

- **Defining the target audience(s);**
- **Tailoring the message** to the target audience(s);
- **Creating a recognizable slogan and/or logo;**
- **Selecting the appropriate avenue** to reach the target audience;
- **Developing consistent and frequent communications;** and
- **Monitoring results.**

DEFINE THE TARGET AUDIENCE

Communities are made up of multiple audiences that can be targeted more specifically. For example, audiences may be targeted based on:

- **Geographic area;**
- **Culture and language;**
- **Location of material generation;**
- **Education level;** or
- **Age group.**

Alternatively, education and outreach could be geared to reach those who currently do not recycle or those who do not recycle properly. It can be challenging to design and implement promotion and education strategies that will target a specific audience. Doing so can reduce costs and increase the effectiveness of outreach and education efforts. It is important to identify the target audience and try to gain an understanding of potential barriers that may prevent them from recycling as well as what is

important to them. Targeting communications to a specific group makes the message more personal, which usually results in greater success.

Groups to target in a community include:

- **Attendees of public events;**
- **Students and faculty** in the local school district;
- **Users of convenience centers;**
- **Businesses;** and
- **Employees** at municipal buildings.

Of all the audiences that might be targeted for outreach and education, one of the most important is the local government's leadership. County and municipal administrators, council and board members, other elected officials and supervisors as well as company executives need to be informed and updated about recycling and waste reduction opportunities in the community. Officials who understand the importance of recycling can become program allies and offer support including:

- **Securing additional funding** and other resources;
- **Reducing administrative obstacles;**
- **Advocating for relevant policy changes;**
- **Acting as a role model for staff and the public;** and
- **Positively influencing others** who do not share the same enthusiasm.

Outreach to local officials and community leaders can be as simple as making presentations at council meetings, inviting them to participate in tours of a material recovery facility (MRF) or tours of businesses or schools with successful recycling programs. It is important to inform leaders of program successes continuously and the benefits to the community as it can move them to adopt and reach sustainability focused goals.

Another potential target audience that cannot be overlooked is county/municipal staff – including convenience center attendants – as they are the face of the recycling program to the public and can lead the community by example. Attendants must have a full understanding of the program to promote it and answer questions, so it is important that staff be well trained. Recycling coordinators may consider developing their own recognition program and having elected officials present the awards.

TAILOR THE MESSAGE

Understanding what motivates different audiences, especially those most in need of encouragement to recycle, is important when developing the message and avenues for promotion and education.

Research shows that information about how to recycle is not always the key to motivation. Economic benefits and simply being asked or told to recycle also can be significant motivators to changing recycling behavior.

When developing a message for a specific audience, consider the following questions.

- **What is the intended message?**
- **What action is desired of the target audience?**
- **What is the take-home message being conveyed?**
- **What should be included in the message to be both efficient and effective without being overwhelming?**
- **What seems to motivate the target group?**
- **How can the target group be reached? What will get their attention?**
- **How can the target audience stay engaged?**

CREATE RECOGNIZABLE GRAPHICS

Brand identity is the tangible and intangible components (e.g., logo, slogan) an organization (or recycling program) uses to visually present itself to the public and shape consumer perception. A recognized logo and/or slogan creates familiarity, trust, and loyalty for the program by using consistent visuals and messages to communicate purpose and encourage participation. Ultimately, a successful brand identity can make the program more appealing to consumers and more effective in achieving its environmental goals.

Clear and consistent communication is necessary to successfully promote any program. SCDES provides layout and design services for printed education and outreach material including brochures, posters, billboards, and other signage for any local government recycling program in the state. In addition, SCDES can customize public service announcements (PSAs) and create artwork for promotional items. If printed material needs to be in additional languages, SCDES can have the material translated. All of these services are available at no cost.

Visual consistency in the recycling program – on containers, signs, logos, and printed material – helps recycling program users participate properly with little effort. For example, if blue



Pictured are a few of the logos and a billboard design developed by SCDES for counties and other recycling partners.

containers are consistently used for recycling paper, bottles, and cans while green containers are consistently used for recycling organics such as food waste, then participating in the program may become almost automatic. Consistency helps keep participation levels high and develops a strong program identity.

SELECT THE RIGHT AVENUES FOR YOUR MESSAGE

Tools available to local government recycling coordinators to disseminate their messages can be grouped into five broad categories. A

description of each category is provided in Table 16.1.

DEVELOP CONSISTENT & FREQUENT COMMUNICATIONS

Communities with long-term sustained outreach programs – with defined audiences – are more successful in increasing participation than one-shot campaigns, no matter how much fanfare or funding is spent on the one-time effort. Regular reporting on program progress can motivate the public by showing that their actions have results. Companies that advertise consumer

TABLE 16.1: Types of Media Available			
TYPE	ADVANTAGES	DISADVANTAGES	EXAMPLES
Advertising	• Can be targeted to specific outlets; • Effective way of explaining details; and • Can be easily duplicated for different media.	• Uses valuable resources; • Can overwhelm audiences with too much material; and • Can be difficult to choose the most effective media.	• Bill inserts; • Posters; • Billboards; • Brochures and flyers; • Calendars; • Newspaper ads; and • Paid advertising in print media.
Broadcast Media	• Can reach the widest audience; • May have in-house radio and/or closed-circuit television station to promote the program; and • Does not use physical material.	• Can be costly; • Can be challenging to find a market in line with the program being promoted; and • Can confuse people if it reaches beyond the target audience.	• Television or radio; • Local cable channels; • Closed-circuit television; • Paid advertising; and • Movie theater advertising.
Online Messaging	• Low cost; • Effective means to provide in-depth information without wasting resources; and • Can be easy to learn and use.	• The wrong audience may find the information and it does not pertain to them; • Older audiences may not use social media; and • Can have technical issues that aren't easily fixable.	• Websites; • E-mails/e-newsletters; • Blogs; • List serves; and • Social media platforms.
Community Engagement	• Allows for a personal interaction and connection with the community; • Provides opportunity for the public to ask questions; and • Provides the opportunity for the coordinator to identify potential concerns or barriers for the program.	• May be costly; • Needs time and volunteers to plan and implement a successful event; and • Needs community support.	• Special events; • School and community group presentations; • Add material to libraries; • Recycling competitions; and • Event recycling.
Prompts & Incentives	• Choosing items that people use on a regular basis will remind them of the program (i.e., reusable bags); • Can facilitate waste reduction and show use of recycled-content material; and • Helps solidify the program as a "brand."	• Can be expensive; • May seem wasteful if the products don't serve a purpose; and • A product may not be useful for everyone.	• Recycling bins with program logo and instructions; • Refrigerator magnets; • Reusable bags with program logo; • Pencils and other supplies; and • Other giveaways.

goods understand the value of frequently repeating messages. Recycling professionals can use the same methods. Constant reminders help keep recycling in people's minds.

Social marketing techniques take typical marketing techniques and applies them to non-commercial, socially beneficial situations in an effort to encourage people to voluntarily "do the right thing."

According to social marketing principles, there are three reasons people do not engage in a socially beneficial behavior (in this case, why people don't recycle).

- 1. People are not aware of the opportunity or its benefits.** People may not know that recycling facilities exist in their area or that the regional MRF provides multiple local jobs.
- 2. People are aware of the opportunity, but may see difficulties or barriers.** Having to take recyclables to a recycling drop-off center or finding storage space in their kitchen or garage until collection day may be seen as difficult. Five of the most common barriers are:
 3. Lack of convenience (Recycling is not available at the curb.);
 4. Established habits (I can't remember to recycle.);
 5. Beliefs (The environment is fine and recycling is not important.);
 6. Time (Sorting material takes too much time.); and
 7. Misinformation (Recyclables are thrown in the trash after collection.).

Some of these barriers are attributable to the individual, such as a lack of knowledge or established habits. Others are situational (e.g., curbside recycling is not available in some communities). Others are a combination – people think sorting material takes too much time because the requirements of the recycling program are not well advertised or communicated.

- 3. People are aware of the opportunity, but see no direct benefit to them or their community.** For example, some may think that recycling is a "feel good" activity that achieves no real benefit or that it draws

resources from programs that are more important to them.

Implementing social marketing concepts can help recycling coordinators improve their program participation by using specific strategies and tactics to remove barriers – real or perceived, internal or external – that prevent recycling behavior from taking place.

The recycling coordinator should do three things in planning to overcome barriers.

- 1. Define and focus on the desired behavior.** It can be helpful to encourage residents to take their bin to the curb every time it is full, even if it only contains aluminum cans, in order to develop the recycling habit. Though other sustainability topics are important, focusing on them could take the attention away from recycling.
- 2. Consider the target audience.** Is it residents of multi-family housing? Young families? Office workers? Residents of a particular region of town that has historically had low participation?
- 3. Consider the conditions the target audience may face as they try to adopt the recycling behavior.** A variety of barriers, values, and habits may exist for each group that can require different tactics and messages. Be willing to meet their needs.

TRACK AND MONITOR RESULTS

Changes in the amounts recycled, the quality of material recycled, or increased participation can indicate success on the part of education and promotion programs. These metrics can be influenced by many other factors.

To obtain other meaningful input about the recycling program, it can be helpful to implement some type of formal qualitative research to gauge the impact on residents' behaviors. This can take the form of telephone and online surveys, focus groups, or comment cards in public places (e.g., libraries, drop-off and community centers).

Direct contact with residents (e.g., distributing fact sheets and brochures at a local fair or festival) can provide an opportunity for recycling coordinators to solicit information directly from the users of the local recycling programs.

Budgeting for Recycling Education & Resources

Resources are often scarce for local government recycling programs. Funding promotion and education can be especially challenging because the benefits are difficult to identify and quantify. Studies from the Recycling Partnership show that a promotion/education program for recycling should be budgeted at a minimum of \$10 per household per year. (If changes are being made to the program, more funding will be required.)

In reality, many programs spend far less than this or do not track how much they spend. Education can have measurable impacts on the costs of a recycling program by:

- **Increasing tonnage**, thereby reducing the cost per ton of recycling (i.e., making the program more cost-effective on a per-ton basis);
- **Increasing total revenue** as a result of the increased volume (if the community receives revenue from the sale of recyclable material);
- **Improving material quality** as people are instructed about what to include in recyclables and how to prepare them. This can result in a reduction of processing costs and/or an increase in revenue; and
- **Reducing disposal costs** for the community.

Support for education and outreach can be obtained if the recycling coordinator can show an increase in recycling and a decrease in disposal after education and outreach efforts have been made. Therefore, it is suggested that this information be tracked with as much detail as possible so that a cost-benefit analysis can be conducted.

When developing an education and outreach program, each community should focus on the areas of greatest importance to them. For example, if contamination of recyclables is a significant issue, participants could benefit from more specific instructions. If tonnage lags behind similar communities, efforts to increase participation may be most beneficial.

Office Resources

The SCDES Office of Solid Waste Reduction and Recycling (Office) has developed recycling education tools to reach a statewide audience and for local recycling coordinators to use in their programs. The state has standardized the appearance of public educational material using a visual theme based on the Recycle Guys and Recycle Right SC.

THE RECYCLE GUYS

Introduced in 1992 as the Office's logo, the Recycle Guys remind everyone to reduce, reuse, and recycle.

The Recycle Guys also encourage people to observe Earth Day and America Recycles Day. Posters and other tools are available featuring a large number of creatively rendered, popular-culture images. These prompts, if used in the right circumstances for the right audiences, can capture people's attention and draw them in to the larger message about recycling. Recycle Guys costumes are available for use at community



events. These resources are provided to recycling coordinators at no charge.

RECYCLE RIGHT SC

Recycle Right SC is an educational outreach campaign, in partnership with PalmettoPride, designed to help decrease the contamination rate in South Carolina. The campaign was officially introduced in October 2019.



Recycle Right SC is designed to:

1. **Increase awareness** of the negative program and environmental impacts of contamination;
2. **Encourage and explain to residents** how to recycle right; and
3. **Provide tools and resources** to local governments to address the issue with a clear, consistent message.

Visit des.sc.gov/recyclerightsc for details about the campaign.

RECYCLE HERE SC APP

The Recycle Here SC app provides guidance to South Carolina residents on what, where, and how to recycle throughout the state. The app – created in partnership with PalmettoPride and the S.C. Beverage Association and introduced on American Recycles Day in 2024 – lists every local government recycling program and offers additional information such as single-day events (e.g., household hazardous waste, paper shredding and electronics collection days). Recycling coordinators are encouraged to promote the app.

Visit des.sc.gov/recycleheresc for more about the app.

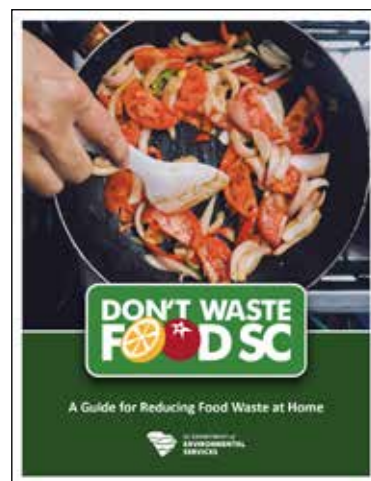


DON'T WASTE FOOD SC (DWFSC)

DWFSC is a collaborative campaign that brings together stakeholders from across public and private sectors dedicated to sharing knowledge, coordinating resources, and working together to help reduce food waste in South Carolina.

Through simple practices, resources can be put to better use including feeding people in need, creating products and energy, diverting material from landfills, and creating jobs. The campaign is designed to increase the awareness of the economic, environmental, and social impacts of wasted food and inspire others to take action through food waste prevention and donation. The goal of the campaign is to cut food waste in half in the state by 2030 (relative to 2016 levels).

Visit des.sc.gov/dwfsc for more information or to get involved.



Don't Waste Food SC Guide

TAKE CHARGE! BE BATTERY SMART

Take Charge! Be Battery Smart is an outreach campaign to raise awareness of both the safety concerns and the recycling opportunities that are available for household batteries.

We all know that batteries are everyday essentials. Often overlooked is the simple fact that batteries can be a hidden household hazard. If improperly installed, charged, stored, used, damaged, or disposed of, some batteries can catch fire or explode, putting your family and others at risk. If swallowed, button and coin batteries can cause injuries and death. Be Battery Smart is a partnership between SCDES and the Recycled Materials Association (ReMA).

To learn more, please visit des.sc.gov/bebatterysmart.



Action for a Cleaner Tomorrow:
A South Carolina Environmental
Curriculum Supplement

THE S.C. SOLID WASTE MANAGEMENT ANNUAL REPORT

The S.C. Solid Waste Management Annual Report provides an overview of the amount of municipal solid waste recycled and disposed of in South Carolina each fiscal year (FY).



The S.C. Solid Waste Management
Annual Report for FY24

ACTION FOR A CLEANER TOMORROW

"Action for a Cleaner Tomorrow" ("Action") is an award-winning, interdisciplinary, activity-based curriculum supplement that introduces waste reduction, recycling, and composting as well as litter prevention and energy conservation to K-12 students in South Carolina.



"Action" was developed by teachers and the Office in conjunction with the S.C. Department of Education in 1993. The 21st revised edition features 23 lessons correlated to 2021 South Carolina College-and-Career Ready Science Standards and includes state-specific information when possible.

The curriculum supplement is available to teachers at no cost who attend a two-hour workshop. Classroom presentations also are available at no cost for specific grade levels. For more information visit des.sc.gov/community-12-schools-students-teachers.

Action is the centerpiece of the Take Action SC Partnership. Learn more about the partnership at takeactionsc.org.

FOR PUBLIC EDUCATION

The Office also provides a number of other educational publications that are available to recycling coordinators to assist with their programs or for public distribution. These include:

- **Activity, Coloring, and Story Books** - like the "Star Recyclers Activity Book," the "I Want You to Color This Recycling Poster Coloring Book" - are to educate young students about recycling and other environmental outreach campaigns. The "Recycle Right" and "Don't Waste Food SC" story book also are aimed at elementary school-aged children. In addition, "The Theory of Recyclability Activity Book" is for middle schoolers; and
- **"Composting: Recycling Naturally"** is a guidebook that provides information on composting options and simple steps for starting at home. For the guidebook and more information on composting, visit des.sc.gov/compost.

FOR BUSINESS RECYCLING, EDUCATION & OUTREACH

The Office also provides a variety of printed material to businesses and other organizations through its S.C. Smart Business Recycling Program. Waste audits are also available for businesses - free of charge - through the program. Visit des.sc.gov/smartbiz for more information.

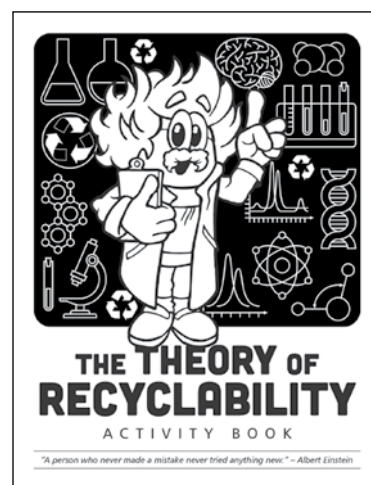


FOR COLLEGE & UNIVERSITY RECYCLING PROGRAMS

RecycleU is a program designed to assist colleges and universities with the implementation and promotion of recycling and buy-recycled efforts on their campuses.



Star Recyclers Activity Book



The Theory of Recyclability Activity Book



The Don't Waste Food SC and Recycle Right Story Books

Officially launched in December 2014, the program includes:

- **Information on the Office website;**
- **Customizable campus recycling guide templates;** and
- **Other educational material.**

Recycle U provides professional, customized educational material and is especially beneficial for colleges and universities with limited budgets and resources.



Please visit des.sc.gov/recycleu for more information.

FOR STATE AGENCIES

State agencies have a responsibility to lead by example and operate in an environmentally responsible manner. The Office offers assistance to state agencies to meet this obligation through the Green Government Initiative. Services provided include:

- **Technical assistance** to support, improve, or expand state agency waste reduction and recycling programs;
- **Signage, posters, and other material** to promote programs; and
- **Current information** about recycled-content product vendors and state contracts.

For more information, see Chapter 17. Also visit des.sc.gov/community/recycling-waste-reduction/state-agency-recycling-responsibilities.

RECYCLING ON THE GO

The Office encourages recycling when you travel. In conjunction with the S.C. Department of Parks Recreation and Tourism, the Office has helped provide recycling opportunities at all of the state's parks.

In addition, recycling also is offered at the Columbia Metropolitan Airport as well as Charleston, Greenville-Spartanburg, and Myrtle Beach International Airports.

Many S.C. local governments also have established recycling collection points in community parks as well as at festivals and other events.

Other Available Resources

- **AMERICA RECYCLES DAY** (November 15) is a national awareness campaign designed to encourage people to recycle and buy products made from recycled material. As part of the campaign, local governments and others throughout the state hold special events to raise awareness of recycling opportunities.

America Recycles Day illustrates two important social marketing strategies:

1. **Encouraging individuals** to make a commitment; and
2. **Making recycling a behavioral norm** (making it a national campaign).

To learn more, visit americarecyclesday.org.



Pictured are recycling bins featuring custom artwork used by Columbia Metropolitan Airport (left) and Sesquicentennial State Park (right). The Office provided both the bins and decals as part of its Recycling On the Go campaign.

Chapter 16: References & Resources

- America Recycle Day - americarecyclesday.org
- Carolina Recycling Association - cra-recycle.org
- Earth 911 - earth911.org
- Recycle Right SC - des.sc.gov/recyclerightsc
- The Recycling Partnership - recyclingpartnership.org
 - The Recycling Partnership, Best Practices for Community Recycling Programs - recyclingpartnership.org/best-practices-for-community-recycling-programs/
 - Paying It Forward: How Investment in Recycling Will Pay Dividends - recyclingpartnership.org/wp-content/uploads/dlm_uploads/2021/05/Paying-It-Forward-5.18.21-final.pdf
- S.C. Department of Environmental Services - des.sc.gov
- Composting: Recycling Naturally - des.sc.gov/compost
- Don't Waste Food SC - des.sc.gov/dwfsf
- Local Government Outreach Resources - des.sc.gov/community/recycling-waste-reduction/local-government-recycling/grant-funding-local-governments
- Recycling Here SC app - des.sc.gov/recycleheresc
- Recycling Information - des.sc.gov/recycle
- S.C. Smart Business Recycling Program - des.sc.gov/community/recycling-waste-reduction/smart-business-recycling-program
- Take Action SC - takeactionsc.org
- U.S. Environmental Protection Agency, "Recycle on the Go" - archive.epa.gov/wastes/conserve/tools/rogo/web/html/index.html

Notes:

[illegible]

Solid Waste Management Plan Requirements

A APPENDIX

The S.C. Solid Waste Policy and Management Act of 1991 (Act) requires the S.C. Department of Environmental Services (SCDES) to develop the State Plan, which is a comprehensive approach to providing efficient and environmentally acceptable solid waste management services and programs.

The first State Plan was adopted in 1992, revised in 1999 and is updated annually through the "S.C. Solid Waste Management Annual Report" as required by the Act.

Counties also must develop local plans that are consistent with the State Plan, address a 20-year planning period, and include:

- **The amount and types of solid waste projected to be disposed of within the county or region** during the 20-year planning period;
- **An estimate of the current capacity within that county or region** to manage its solid waste;
- **An analysis of the waste facilities** that will be needed to manage the solid waste generated during the projected 20-year period;
- **An estimate of the cost of implementing the solid waste management plan** within that county or region;
- **A description of the recycling program** including material to be source separated and how the county will manage material banned from MSW landfill disposal (e.g., consumer electronics, large appliances, lead-acid batteries, used motor oil, used oil filters, whole waste tires, yard trimmings);
- **Information about the recycling collection, processing and marketing system;**
- **A description of incentives or penalties** intended to encourage recycling;

- **A description of the public education program** that will inform residents of the benefits of recycling and waste reduction as well as proper instructions on how to participate in the recycling program;
- **Any other efforts to comply with the disposal goal** of 3.25 pounds per person per day (p/p/d); and
- **A discussion of local barriers to increasing recycling** as well as policies and strategies to be used at the local level to overcome these barriers.

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Conducting a Waste Audit

Conducting a waste audit is another helpful tool that can help recycling coordinators identify the types and amounts of waste generated by residents and businesses as well as assess current waste management practices and costs. The information gained is useful in determining which material might be suitable for a waste reduction or recycling program.

The following seven steps describe how to conduct a waste audit.

1. Review hauler data. Determine how much waste is being collected in the community on a weekly, monthly or yearly basis. Typically annual tonnage for the entire community is used, however an audit also may be done for a specific residential collection route in which only the tonnage from that route would be analyzed. Are there monthly/seasonal fluctuations?

2. Develop the audit plan and develop recording forms. The audit plan will identify/define the following types of information:

- Sampling locations;
- Number of samples to be taken at each location;
- Number of material categories to be sorted;
- Definitions and examples for each material category;
- Sampling schedule;
- Logistics (how samples will be collected, where they will be placed for sorting, equipment needed, etc.);
- Roles and responsibilities; and
- Data analysis methodology.

A data collection form will be created to record the data and will be included in the sampling plan (see the end of Appendix B for an example). The local government staff responsible for risk management/environmental safety should review plan.

3. Designate and train an audit team.

- Designate a field supervisor or manager (likely an Environmental Services staff person).

- Hire or recruit sorters (may be department staff, temporary staffing recruits, or volunteers).
- Ensure all roles and responsibilities are understood.
- Emphasize safety.

4. Gather supplies.

- Personal protective equipment (PPE) (e.g., cut-resistant gloves; safety vests, safety glasses)
- Containers (e.g., plastic garbage cans, roll-carts, bins, totes);
- Shovel, broom, rake, and dust pans;
- Tarps;
- Platform scale;
- Recording forms, clip boards, and writing utensils;
- First aid kit; and
- Camera (digital or video).

5. Conduct the audit.

- Label each container with signage indicating the material category.
- Weigh each container empty and record the baseline weight.
- Place a large tarp on the floor and spread a typical day's worth (or representative sample from a day's worth) of solid waste on it. (If conducting the audit at a landfill or transfer station, it may not be necessary to use a tarp.)
- Sort material by type (e.g., paper, plastics, glass bottles, metals, food scraps).
- Weigh each category. Typically the container weight is subtracted during the data analysis at the office, not in the field.
- Recycle or dispose of material when audit is complete.

6. Record results. Use the "Conducting a Waste Audit" worksheet at the end of Appendix B to:

- Record the date, sampling location, sample number, etc.

- Record point of generation [i.e., route number, truck number, whether or not the sample came from a residential, commercial, multi-family dwelling (MFD) or mixed load, etc.];

7. Analyze results. Typically, analyzing results will involve entering tonnage data into a spreadsheet, by category, for each location and date of sort. The analysis will provide an estimated percentage of each material that comprises the total waste stream. Those percentages can then be applied to the total annual tons disposed of to determine potential tons of recyclable material currently being landfilled. When the analysis is done, the data can be reviewed to note whether:

- Targeted material is being properly managed;
- Other potentially recyclable material comprises a significant portion of the waste stream, either by weight or by volume;
- Toxic material, banned items, or difficult to manage items (e.g., electronics, yard waste) are being placed in the garbage instead of being collected separately; and
- Anything can be inferred (or was observed) regarding education and outreach.

It is necessary to ensure the waste audits are representative (and include all routes) to gain a full understanding of city-wide waste generation. It is important to schedule waste audits during “typical” time periods to

Recycled Material Audits

Recycling facilities often conduct audits of the incoming material stream using the methodology described in this appendix to understand recyclers’ behaviors. Identifying common contaminants in the material stream can help recycling coordinators develop more effective education and outreach campaigns.

Recycling facilities also can conduct bale audits – breaking apart already sorted bales to identify the bale composition. This can help identify how the material stream is evolving, ensure that the appropriate type of bale is being marketed, and that the bale falls within end-market specifications.

It also reveals how accurately the facility is sorting. A high degree of mis-sorting can point to equipment maintenance issues or sorter training needs.

the extent possible (e.g., avoid weeks with holidays that may alter the composition of the waste stream).

If time or resources are limited, conduct a visual audit. This includes looking in curbside garbage containers and/or recycling containers or looking at loads as they are emptied at the disposal facility. Identify what material is generated, recovered, and the extent to which recycling programs are being carried out as designed.

DETAILED INSTRUCTIONS: Conducting a Visual Audit

Visual waste audits yield less precise results, but also require significantly fewer resources, are less disruptive to conduct, and can still provide useful information. They can be done at a disposal facility or at an individual dumpster.

The following is a methodology for the visual characterization of waste samples.

1. Estimate total volume of load. The first step in the observation process is to estimate the total volume of each load. This is accomplished by estimating three basic dimensions: 1) length; 2) width; and 3) height of the load after it has been discarded on the tipping floor or the size of the vehicle. Record all measurements.

2. Identify and record material categories in load. Walk entirely around the load in one direction and place a check on the Waste Characterization Data Form (provided) by each of the material categories appearing in the load. Walk around the load in the opposite direction and confirm the material present or view the load as it is dumped on the tipping floor so it can be estimated from a distance. Take pictures as it is dumped for reference.

3. Estimate composition by volume of load. Beginning with the largest material category by volume, estimate the volumetric percentage of this material to the nearest 5 percent and record it on the Waste Audit Form. Repeat this process (for the next most common material) until the percentage of each material that represents at least 5 percent of the load has been estimated.

4. Review the estimated volume of each component material in the load. The sum of the percentages for each visual audit sample should add to 100 percent.

5. Convert to weight-based percentages. Subsequent to the field work, visual audit percentages by volume are entered into a database that uses the percentage by volume numbers recorded in the field to compute to cubic yards. The volumetric percentages by material type are then converted from cubic yards to pounds using conversion factors developed from various industry publications.

Conducting a Waste Audit Worksheet

1. Begin the waste audit.

- Assemble the waste to be sorted, using either one day's worth of waste or an otherwise representative sample of waste from the building/department.
- Weigh the empty containers that the sorted waste will be placed into and record these weights on a label on each container.
- Sort the waste sample by major material type categories (e.g., paper, plastic, glass, metal, compostable organics, other). If needed, further sort each major material types into more specific component subcategories (e.g., glass could be sorted into clear, green, brown, or other).
- Place the sorted material into separate labeled containers.

2. Calculate the net material category weights.

- Weigh each filled waste container and subtract the weight of the container to obtain the net material type weight. Record the net material type weight on the space provided on the Waste Audit Form, Column A (on the following page). If you are not sorting into more detailed material subcategories, proceed to Step 2-C.
- If you sorted the material types into subcategories, add their net weights and record the total net material weights on the Waste Audit Form.
- Add all the total material type/weight figures to determine the total sample weight and record this total at the bottom of the Waste Audit Form.

3. Calculate the percent to total sample weight.

- Use this formula to calculate the percentage each material type represents of the total sample weight.

$$\frac{\text{net material type weight}}{\text{total sample weight}} \times 100 = \text{percent of total sample weight} \%$$

- Record data in column B on Waste Audit Form. Use the data in the Percent of Total Sample Weight column to create a pie chart to help compare the percentages of the different material types in the waste stream.

4. Estimate the total annual waste generation by material type.

- If you sorted one (typical) day's worth of waste, estimate the weight of waste generated for each material type annually using the following formula.

$$\frac{\text{net material type weight}}{\text{weight}} \times \frac{\text{number of working days}}{\text{per year}} = \frac{\text{weight of material}}{\text{generated annually}}$$

- If you sorted a representative sample, first weigh or estimate all the waste generated by your facility that day. Calculate the amount of waste generated annually for each material type by using the following formulas.

$$\frac{\text{total sample weight (all types)}}{\text{total waste amount generated per day}} = \text{sort multiplier}$$

$$\frac{\text{net material type weight}}{\text{weight}} \div \text{sort multiplier} \times \frac{\text{number of working days}}{\text{per year}} = \frac{\text{annual weight}}{\text{of material}}$$

- Repeat the appropriate calculation (A or B) for each material type and record on Waste Audit Form, Column C. Note, this process does not include any material currently being recycled. The intent is to focus on identifying waste streams currently being disposed of in landfills. If your facility wants to know the total tons generated, add in the quantity of any material known to be recycled per year.

Waste Audit Form

AUDIT SPECIFICS			
Date of Audit:		Building/Department(s):	
Source of Sample:			
Sample Collected (specify weight):		☐ All Waste ☐ Representative Sample	POUNDS
Total Weight of Waste Generated on Audit Date:			POUNDS
Team Members Conducting the Audit:			
Factors Affecting the Audit:			

MATERIAL	COLUMN A Net Material Type Weight	COLUMN B Percent of Total Sample Weight (All Material Types)	COLUMN C Weight of Material Type Generated Annually
PAPER			
White ledger paper or pads			
White form-feed paper			
White copy paper			
Cash register receipts			
Adding machine tape			
Envelopes			
Windowed envelopes			
Colored paper			
Yellow legal pads			
Letterhead			
Message pads			
Newspapers			
Magazines			
Corrugated cardboard			
Cardboard tubes			
Mixed waste paper			
Unwanted mail			
Coated stock			
Stick-on notes			
Paperboard (e.g., cereal boxes)			
Paper plates/cups			
Napkins/towels			
Tissue paper			
Wax-coated paper			
Plastic-coated paper			
Carbon paper			
Other paper			

MATERIAL	COLUMN A Net Material Type Weight	COLUMN B Percent of Total Sample Weight (All Material Types)	COLUMN C Weight of Material Type Generated Annually
PLASTIC			
#1 PET (e.g., soda bottles)			
#2 HDPE bottles (e.g., milk jugs)			
#2 HDPE film			
#3 Vinyl bottles, pipe, siding			
#4 LDPE film			
#5 Polypropylene			
#6 Polystyrene foam			
#6 Rigid polystyrene			
Other plastic			
METAL			
Aluminum cans			
Aluminum foil			
Other aluminum (rain gutters, etc.)			
Steel cans			
Other ferrous metals			
Other metals			
GLASS			
Brown			
Clear			
Green			
Other			
LIGHTING			
CFLs			
Fluorescent bulbs			
Incandescent bulbs			
FOOD SCRAPS			
Baked goods			
Cooking oil			
Fruit/vegetable scraps			
Grease			
Packaged food			
Meat scraps			
Other food scraps			
WOOD			
Lumber			
Crates or pallets			
Land-clearing debris			
Other wood			
YARD TRIMMINGS			
Grass clippings			
Leaves and brush			
AUTOMOTIVE ITEMS			
Lead-acid batteries			
Used motor oil			
Used oil filters			

[illegible]

Components of a Good RFP & Contract

Below are some components of a well-devised contract. Some specifications apply only to collection or material recovery facility (MRF) operations.

- **Clearly Defined Terms**

- Service(s) to be provided
 - Services (recyclables, yard trimming, garbage)
 - Same-day service (from resident perspective)

- **Days of Collection, Start/End Times**

- **Holidays**

- **Manner of Collection**

- Obey traffic laws
- Provide maps/routes (written permission to change)
- No littering
- Restrictions on weight set-outs, size, etc.
- Return bins/carts
- Keep material streams separate

- **Facility or MRF Where Material Is to be Delivered** and how payment is made for delivery (e.g., who pays processing fee, is it included in bid price?)

- **Adequate Background Information and Data**

- **Clear Expectations Regarding Qualifications and Experience**

- Detailed performance specifications addressing the following factors:
 - Location (for MRF) and collection areas;
 - Regulatory compliance;
 - Recyclables accepted (initial and provisions for the future);
 - Markets for processed material (for MRF);

- Capacity (for MRF);
- Vehicle access, operating hours, weighing, record keeping and reporting (for MRF);
- Residue management and limits (for MRF);
- Start-up schedule/Contract start date;
- Handling of complaints (who interacts with customer, how information is conveyed between parties);
- Billing responsibilities;
- Communication systems;
- Record-keeping and reporting requirements; and
- Public education (if included).

- **Vehicle Requirements**

- Type of collection
- Number of spare vehicles

- **Container Requirements**

- Ownership
- Whether RFID tag
- Whether recycled content required/level of PCR
- Replacement policy (i.e., charge residents if need to be replaced?)
- Sizes/options for replacement
- Who distributes initially?
- Who is responsible for maintenance/repairs?
- Cleaning/painting requirements (if dumpsters, compactor service is included)

- **Public Education Requirements** (e.g., distribution of literature, tags for improper set outs, signs on vehicle, rebate to the local government to cover the cost of education)
- **Personnel Requirements**
 - Training
 - Uniform with company name
 - Valid license
 - Level of supervision
 - Regular safety training
 - Staffing level (e.g., per vehicle)
- **Ownership of Recyclables**
- **Incentives for Increasing Performance** (e.g., resource management contract)
- **Penalties for Poor Performance/Liquidated Damages**
- **Contingencies for Natural/Man-Made Disasters**
- **Opportunities for Amending Scope to Address Changing Circumstances** (e.g., good faith negotiations, future plans)
- **Performance Security** (e.g., security bond, letter of credit requirements)
- **Avenues for Resolving Disagreements** (e.g., mandatory third-party mediation clause)
- **Points of Contact**
- **Clear Financial/Cost Proposal Instructions**
- **Price Escalators/Adjustments** (e.g., basis for adjustments – Consumer Price Index, fuel index)
- **Default/Termination** (clearly define process)
- **Replacement of Defaulted Contractor** (e.g., performance bond, others have right of first refusal)
- **Terms of Agreement** (e.g., 5 to 10 years with optional 1-year renewals)
- **Insurance Requirements** (e.g., liability, worker's compensation)
- **Change of Law, Amendments and Waivers**
- **Assignment** (The vendor is still responsible. The local government must approve subcontractors.)
- **Description of Selection Process**

Interviewing Recycling Service Providers

D APPENDIX

When looking into starting or improving a recycling program, it is important to research services provided by different recyclers. This worksheet provides a format for organizing information collected while you are researching options. Also, remember that you may be able to negotiate with the service providers, particularly in situations where several operate in the area.

Most haulers that collect recyclables also collect garbage - and do so under the same contract - so you likely will be asking about both recyclables and garbage collection services. If

some buildings/customers require a compactor, be sure to let potential vendors know.

In addition to interviewing potential haulers for recycled materials, it is important to understand your current waste hauling contracts, the ability to reduce waste container sizes/number of pulls and the length of the contract. In general, it is recommended that a written contract be developed instead of a verbal agreement.

NAMES OF RECYCLERS:	RECYCLER NO. 1:		
	RECYCLER NO. 2:		
	RECYCLER NO. 3:		
MATERIAL COLLECTED INCLUDES:	RECYCLER NO. 1:	PAPER GRADES/TYPES: ☐ Yes ☐ No	METAL MATERIAL TYPES: ☐ Yes ☐ No
		PLASTIC RESINS/MATERIAL TYPES: ☐ Yes ☐ No	OTHER MATERIAL: ☐ Yes ☐ No
	RECYCLER NO. 2:	PAPER GRADES/TYPES: ☐ Yes ☐ No	METAL MATERIAL TYPES: ☐ Yes ☐ No
		PLASTIC RESINS/MATERIAL TYPES: ☐ Yes ☐ No	OTHER MATERIAL: ☐ Yes ☐ No
	RECYCLER NO. 3:	PAPER GRADES/TYPES: ☐ Yes ☐ No	METAL MATERIAL TYPES: ☐ Yes ☐ No
		PLASTIC RESINS/MATERIAL TYPES: ☐ Yes ☐ No	OTHER MATERIAL: ☐ Yes ☐ No
Is there a minimum VOLUME or WEIGHT REQUIREMENT for collection?	RECYCLER NO. 1:	VOLUME:	WEIGHT:
	RECYCLER NO. 2:	VOLUME:	WEIGHT:
	RECYCLER NO. 3:	VOLUME:	WEIGHT:
Is there a FREQUENCY OF COLLECTION (FOC) SCHEDULE or are ON-CALL SERVICES provided?	RECYCLER NO. 1:	FOC SCHEDULE: ☐ Yes ☐ No	ON-CALL SERVICE: ☐ Yes ☐ No
	RECYCLER NO. 2:	FOC SCHEDULE: ☐ Yes ☐ No	ON-CALL SERVICE: ☐ Yes ☐ No
	RECYCLER NO. 3:	FOC SCHEDULE: ☐ Yes ☐ No	ON-CALL SERVICE: ☐ Yes ☐ No
What are the FEES CHARGED for collection of RECYCLING and WASTE CONTAINERS ?	RECYCLER NO. 1:	RECYCLING FEE: \$	WASTE FEE: \$
	RECYCLER NO. 2:	RECYCLING FEE: \$	WASTE FEE: \$
	RECYCLER NO. 3:	RECYCLING FEE: \$	WASTE FEE: \$

What is the FEE FOR MATERIAL PROCESSING or DISPOSAL ?	RECYCLER NO. 1:	MATERIAL PROCESSING: \$	DISPOSAL: \$
	RECYCLER NO. 2:	MATERIAL PROCESSING: \$	DISPOSAL FEE: \$
	RECYCLER NO. 3:	MATERIAL PROCESSING: \$	DISPOSAL FEE: \$
What are the PRICES PAID for recyclable material? (If applicable, indicate material types, how they are sorted and whether loose/baled and associated revenues per ton.)	RECYCLER NO. 1:	/ \$	/ \$
		/ \$	/ \$
	RECYCLER NO. 2:	/ \$	/ \$
		/ \$	/ \$
	RECYCLER NO. 3:	/ \$	/ \$
		/ \$	/ \$
Must recyclables be SEPARATED or can they be MIXED/COMMINGLED ?	RECYCLER NO. 1:	ITEM:	ITEM:
	☐ MIXED?	ITEM:	ITEM:
	RECYCLER NO. 2:	ITEM:	ITEM:
	☐ MIXED?	ITEM:	ITEM:
	RECYCLER NO. 3:	ITEM:	ITEM:
	☐ MIXED?	ITEM:	ITEM:
What are the CONTAINER RENTAL and/or MAINTENANCE FEES ? (Do they differ for trash and recyclables?) (for convenience center servicing/commercial)	RECYCLER NO. 1:	RENTAL FEE: \$	MAINTENANCE FEE: \$
	RECYCLER NO. 2:	RENTAL FEE: \$	MAINTENANCE FEE: \$
	RECYCLER NO. 3:	RENTAL FEE: \$	MAINTENANCE FEE: \$
Are MONTHLY REPORTS provided showing the tonnages or cubic yards recycled and disposed of?	RECYCLER NO. 1:	MONTHLY REPORTS? ☐ Yes ☐ No	
	RECYCLER NO. 2:	MONTHLY REPORTS? ☐ Yes ☐ No	
	RECYCLER NO. 3:	MONTHLY REPORTS? ☐ Yes ☐ No	
Is a BALER PROVIDED for corrugated cardboard or other material? Is a FEE CHARGED for providing one? (for convenience center servicing/commercial)	RECYCLER NO. 1:	BALER PROVIDED? ☐ Yes ☐ No	FEE: \$
	RECYCLER NO. 2:	BALER PROVIDED? ☐ Yes ☐ No	FEE: \$
	RECYCLER NO. 3:	BALER PROVIDED? ☐ Yes ☐ No	FEE: \$
Is TRAINING PROVIDED ? Is a FEE CHARGED for this service? (if baler provided)	RECYCLER NO. 1:	TRAINING? ☐ Yes ☐ No	FEE: \$
	RECYCLER NO. 2:	TRAINING? ☐ Yes ☐ No	FEE: \$
	RECYCLER NO. 3:	TRAINING? ☐ Yes ☐ No	FEE: \$
Is help PROVIDED TO DESIGN a recycling program and/or conduct a walk-through of the facility? Is a FEE CHARGE for this service? (commercial)	RECYCLER NO. 1:	DESIGN/WALK-THRU? ☐ Yes ☐ No	FEE: \$
	RECYCLER NO. 2:	DESIGN/WALK-THRU? ☐ Yes ☐ No	FEE: \$
	RECYCLER NO. 3:	DESIGN/WALK-THRU? ☐ Yes ☐ No	FEE: \$
What ability/experience is available in providing EDUCATIONAL MATERIAL ? What is the COST of this material?	RECYCLER NO. 1:	EDUCATIONAL ITEMS? ☐ Yes ☐ No	COST: \$
	RECYCLER NO. 2:	EDUCATIONAL ITEMS? ☐ Yes ☐ No	COST: \$
	RECYCLER NO. 3:	EDUCATIONAL ITEMS? ☐ Yes ☐ No	COST: \$

Can CONTAINER SIZES be "CHANGED OUT" during the contract? Is a FEE CHARGED for doing so? (convenience center servicing/ commercial)	RECYCLER NO. 1:	CHANGE OUT? ☐ Yes ☐ No	FEE: \$
	RECYCLER NO. 2:	CHANGE OUT? ☐ Yes ☐ No	FEE: \$
	RECYCLER NO. 3:	CHANGE OUT? ☐ Yes ☐ No	FEE: \$
HOW MANY YEARS has this company been in business?	RECYCLER NO. 1:	NUMBER OF YEARS:	
	RECYCLER NO. 2:	NUMBER OF YEARS:	
	RECYCLER NO. 3:	NUMBER OF YEARS:	
REFERENCES			
RECYCLER NO. 1			
REFERENCE NO. 1:		REFERENCE NO. 2:	
TELEPHONE:		TELEPHONE:	
EMAIL:		EMAIL:	
NOTES:		NOTES:	
RECYCLER NO. 2			
REFERENCE NO. 1:		REFERENCE NO. 2:	
TELEPHONE:		TELEPHONE:	
EMAIL:		EMAIL:	
NOTES:		NOTES:	
RECYCLER NO. 3			
REFERENCE NO. 1:		REFERENCE NO. 2:	
TELEPHONE:		TELEPHONE:	
EMAIL:		EMAIL:	
NOTES:		NOTES:	

Compost Processing & Management Methods

Small-Scale Composting

Combining nitrogen-rich plant-based organics like kitchen scraps (also called greens) with other carbon-rich plant material such as dry leaves (also called browns) in a ratio of three parts brown to one part green.

Visit des.sc.gov/compost to see the S.C. Department of Environmental Services (SCDES) Office of Solid Waste Reduction and Recycling's (Office) residential and school compost guides.



ADVANTAGE:

- Many manufactured containers are available, but are not necessary. Bins can be constructed from scrap wood and fence wire.

OTHER CONSIDERATIONS:

- Time required depends on the care taken in the mix, frequency of turning, and temperature.
- It is generally best to avoid including meat, fish, and dairy products.
- Material must be kept mixed, moist, and warm (140° to 160°).



Pictured is a home-made, backyard compost bin constructed of used wooden pallets.

Vermicomposting

Using special bins to deliberately cultivate hundreds of active, feeding hungry worms that turn nitrogen-rich food waste as well as the moist, carbon-rich bedding - dampened brown leaves, shredded paper or composted animal manure - into a rich soil amendment called "castings."

ADVANTAGES:

- Worm boxes can be made of scrap wood or plastic bins can be purchased.
- A worm box that measures 2 feet wide by 2 feet long by 1 foot deep can process about 4 pounds of food waste a week - the amount of food waste typically generated by two people.
- The worms turn the bedding and kitchen waste into a dark, rich soil amendment.



This commercially made backyard compost bin is designed specifically for vermicomposting.

OTHER CONSIDERATIONS:

- Generally small in scale.
- Bins should have a lid, drainage holes, and ventilation holes around the top of the bin and should sit on a waterproof tray.
- A pound of worms is recommended to start.
- Food waste should be buried in the bedding material daily.
- Red worms, also called “red wigglers,” can be purchased from specialty suppliers.
- Soil is harvested by pushing the bedding to one side of the container and adding new bedding to the other side. Adding food waste only to the new bedding entices the worms to move from the old bedding.

Windrow Composting

Leaves, chipped brush, food waste, and/or other vegetative trimmings are laid down in elongated piles called windrows.

ADVANTAGES:

- It is a proven, low-tech method of composting.
- It is relatively cost-effective.
- Open-air windrows are outdoors or under a roof, but not enclosed by walls.
- Enclosed windrow composting can help address odor concerns.
- Exhaust air from an enclosed composting process may be captured and routed to a waste gas purification system (e.g., scrubber, biofilter).



Pictured are covered windrows at a commercial composting facility.

A more cost-effective technology being used is a Gore™ Cover System – a semi-permeable membrane cover used to control oxygen and temperature – or cover with clean soil or finished compost.

OTHER CONSIDERATIONS:

- It takes 3 to 6 months to process, depending upon weather.
- Windrows are kept moist by watering if necessary.
- Windrows are agitated and aerated by turning with either a front-end loader or a windrow turner.
- Operators note temperature, age of windrows, and progress of compost.
- The length of windrows varies with material quantity and site size.
- Width and height should be constructed to specific dimensions to optimize the composting process.

Windrow Type 1: Passive Static Pile Composting

This type of composting uses perpendicular, perforated pipes embedded in each windrow. No air is forced through the pipes, but instead, a chimney effect conveys hot air through the piles.

ADVANTAGES:

- Turning/agitation is not necessary to aerate the windrows.
- It is beneficial for extremely odorous wastes because the air movement is slow and unforced. This allows odors to escape gradually or to be absorbed by the compost.
- It works well for green waste composting.

OTHER CONSIDERATIONS:

- There is no way to control the amount of air delivered to the compost and influence the rate of decomposition.
- It is less suitable for waste that may require pathogen reduction (e.g., biosolids).

Windrow Type 2: Aerated Static Pile (ASP) Composting

The same system as the passive static pile with a perforated pipe along the bottom of the windrow, but uses a blower to create pressure or suction on the pile.

ADVANTAGES:

- If suction is used, then an odor filter pile (or a biofilter) of screened compost can be used to filter the air and absorb the odors.
- It works well for several types of waste including green waste, biosolids and food waste. Negative air suction reduces the potential for odors.
- This method can reduce material handling, environmental exposure to leachate, and odors.

OTHER CONSIDERATIONS:

- It requires a higher level of technology and operational skill than turned windrow systems.
- It is usually constructed under a roof to allow for better control of moisture levels. Open buildings without walls are suitable.
- Piles cannot be moved or turned without risk to the system. Ingredients must be mixed thoroughly prior to construction of the aerated piles.
- Having holes is critical so that air can flow as evenly as possible through the piles to maintain optimal temperature throughout.

In-Vessel Composting

This method is composting material in a closed system such as a drum, silo, concrete-lined trench or similar equipment.

ADVANTAGES:

- Environmental conditions – including temperature, moisture, and aeration – are closely controlled.
- It usually has a mechanism to turn or agitate material for proper aeration.
- Systems usually can process large amounts of waste without taking up as much space as the windrow method.
- Systems vary greatly in size.
- It can be used all year in virtually any climate.
- It produces very little odor and minimal leachate.
- The conversion of organic material to compost can take as little as a few weeks.
- It accommodates virtually any organic material (e.g., meat, animal manure, biosolids, food waste).

OTHER CONSIDERATIONS:

- It can be relatively costly compared to other composting methods.
- Once the compost is removed from the vessel, it still requires a few more weeks or months for the microbial activity to stabilize and cool.

Records Review: Current Waste Management Costs

APPENDIX

This worksheet can be used to record information about how solid waste is removed from your agency and to help estimate the total annual cost of waste management services.

Appropriate records (e.g., hauling contracts, maintenance, operating logs, invoices, waste removal records) are the primary sources of information needed to complete this worksheet. Maintenance staff also may be able to provide information.

Waste removal costs can be charged via a flat-fee or a per-pull charge that is levied each

time a container is hauled or emptied. They usually are charged with container rental and maintenance fees (charged monthly, quarterly, or annually). In addition, some haulers charge a separate disposal fee based on the weight of the garbage.

This worksheet is designed to capture all costs. If waste removal practices vary significantly among buildings or if different waste contractors are used, make copies and record the information separately for each building or service provider.

FACILITY INFORMATION				
Building:		Department:		
Contact Name:				
Address:				
City:		State:	Zip:	
Phone:		Email:		
WASTE HAULING & DISPOSAL COSTS				
PART A: Hauler Contact Information				
Hauler Name:		Contact Name:		
Address:				
City:		State:	Zip:	
Phone:		Email:		
Expiration Date:				
PART B: Containers & Removal Schedule				
CONTAINER	TYPE (dumpster/roll-off, compactor)	SIZE	FREQUENCY OF COLLECTION (No. per day/week/month)	DAY(S) OF WEEK COLLECTED (or upon request)
No. 1				
No. 2				
No. 3				
No. 4				
No. 5				
PART C: Waste Management Charge (if charged as a flat fee or part of rent)				
$ \begin{array}{ccccc} \$ & & & \times 100 & \\ \hline & & & & \$ & \% \\ \hline \text{waste removal fee} & \times & \text{No. of times per year} & \times & \text{annual waste management charge} \end{array} $				

WASTE HAULING & DISPOSAL COSTS					
PART D: Waste Removal Charge (If charge per-pull, indicate the total and/or per-container pull free.)					
CONTAINER	PER-PULL FEE	X	NO. OF PULLS PER YEAR	=	TOTAL ANNUAL PULLS FEES
No. 1	\$	X		=	\$
No. 2	\$	X		=	\$
No. 3	\$	X		=	\$
No. 4	\$	X		=	\$
No. 5	\$	X		=	\$
PART E: Container Rental and/or Maintenance Fees (Indicate the per-container and/or total container rental/maintenance fees per year.)					
CONTAINER	MONTHLY OR QUARTERLY RENTAL/MAINTENANCE FEE	X	ANNUALIZATION MULTIPLIER (12 if monthly fee; 4 if quarterly fee)	=	TOTAL ANNUAL MAINTENANCE RENTAL FEES
No. 1	\$	X		=	\$
No. 2	\$	X		=	\$
No. 3	\$	X		=	\$
No. 4	\$	X		=	\$
No. 5	\$	X		=	\$
PART F: Waste Disposal Fee (if charged separately for disposal)					
\$					\$
charge per ton or cubic yard		X	tons or cubic yard per year		= total annual disposal fee
PART G: Total Waste Management Costs Per Year					
Sum of Applicable Annual Charges and Fees (Parts C through G)					Total: \$

QUICK-REFERENCE MEASUREMENT CHART	
WEIGHT: 1 TON = 2,000 Pounds	VOLUME: Common Container Sizes - 4, 6, 8, 20, 30, 40 cubic yards
Check with your vendors to verify what size container you have.	

Recycling Awareness Survey

Surveying the residents of your recycling program can help you to target education and outreach to promote the program. The survey also can provide insight on residents' knowledge of the program.



1. Rate your knowledge of the current recycling program.

- ☐ There's a recycling program?
- ☐ I know we have a program in place.
- ☐ I have an average amount of knowledge.
- ☐ I am confident in my knowledge on the program.
- ☐ I educate others on the program.

2. How often do you recycle?

- ☐ I refuse to recycle.
- ☐ I don't go out of my way to recycle, but will if I'm near a recycling container.
- ☐ I recycle if I have the opportunity.
- ☐ I will go out of my way to make sure I recycle.
- ☐ I recycle everything that is accepted.

3. Check all the following streams that you know are available in the current curbside recycling program (if applicable).

- ☐ Electronics
- ☐ Glass
- ☐ Hazardous household waste (HHW)
- ☐ Metal
- ☐ Organics
- ☐ Paper
- ☐ Plastic
- ☐ Other
- ☐ Waste mixed/commingled cans and bottles

4. Check all of the drop-off locations available in your county that you are aware of.

- ☐ Drop-off location A
- ☐ Drop-off location B
- ☐ Drop-off location C
- ☐ Drop-off location D
- ☐ Drop-off location E

5. Are there any ways to improve the current recycling program?

- ☐ Add more drop-off sites.
- ☐ Add more containers at drop-off sites.
- ☐ Increase advertisement and promotion of the program.
- ☐ Offer more education on the program.
- ☐ Other (please specify): _____

