Report of the
Joint Legislative Audit and Review Commission
To the Governor and
The General Assembly of Virginia

Waste Reduction Efforts in Virginia

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In Brief

Waste Reduction Efforts in Virginia

SJR 361 (2007) directed JLARC to evaluate Virginia's waste minimization, reuse, and recycling efforts.

State and local waste reduction efforts are characterized by strengths and weaknesses. Virginia has adopted a waste management hierarchy prioritizing source reduction, reuse, and recycling above disposal. The State also requires local solid waste planning and has established minimum mandatory recycling rates for solid waste planning units (SWPUs). However, limited resources hinder compliance with State laws and assistance to localities in finding and developing recycling markets. Long-term waste reduction goals have not been identified. Verification of reported recycling rates is also affected by limited resources.

At the local level, most SWPUs report meeting their mandated rates, but some have struggled to do so. Efforts to increase household participation in curbside collection could prove helpful.

Additional resources could be used to provide greater coordination of State and local waste reduction activities, enhance public outreach, and assist with recycling market development. Besides the mandated recycling rates, the State may also wish to consider a statewide goal of lowering per-capita waste disposal.

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This report is available on the JLARC website at http://jlarc.state.va.us

COMMONWEALTH of VIRGINIA

Joint Legislative Audit and Review Commission

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December 11, 2008

The Honorable M. Kirkland Cox
Chairman
Joint Legislative Audit and Review Commission
General Assembly Building
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Dear Delegate Cox:

Senate Joint Resolution 361 of the 2007 General Assembly directed the Joint Legislative Audit and Review Commission to study Virginia's waste minimization, reuse, and recycling efforts. Staff were specifically directed to review the effectiveness of State-administered waste reduction efforts, as well as successful practices in use in Virginia and other states, and to recommend long-term goals for waste reduction and determine the legal and economic prerequisites to achieve those goals. Findings of the study were presented to the Commission on September 8, 2008.

On behalf of the Commission staff, I would like to thank the Department of Environmental Quality staff for their assistance during this study. I would also like to thank the Department of General Services, the Virginia Recycling Association, and the State entities, local governments, and solid waste planning units who organized interviews and site visits, and completed our surveys.

Sincerely,

Philip A. Leone
Director

PAL/ehm

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JLARC Report Summary:
Waste Reduction Efforts in Virginia

Key Findings

- Virginia's statutory framework for waste management indicates that waste reduction is preferred over disposal in landfills or incineration. However, few resources are dedicated to waste reduction, and long-term waste reduction goals have not been identified. (Chapter 4)

- Resources limit compliance with State laws and State assistance to localities in finding and developing recycling markets, and strong markets are necessary to help offset collection costs. Viable markets appear to enhance the effectiveness of State programs to recycle tires and lead-acid batteries. (Chapter 5)

- State agencies and universities indicate they have recycling programs in place. However, there is little guidance for the programs, and source reduction or pollution prevention efforts are limited. (Chapter 6)

- Localities use different methods and data sources to calculate their recycling rates. Greater verification of recycling data could make reported recycling rates more accurate and identify programs in need of improvement. (Chapter 7)

- Most solid waste planning units (SWPUs) report meeting their mandated recycling rate, but a subset of SWPUs have struggled to do so. The performance of recycling programs is affected by population density, public education, and participation in regional partnerships. Generally, collection costs and limited markets make recycling more expensive for Virginia localities than disposal of waste in landfills. However, in high population density areas, recycling and landfill disposal costs compare more favorably. (Chapters 3, 8)

- Container deposit laws seem to be effective at reducing litter but may be less effective at increasing statewide recycling rates. Improper disposal of plastic bags may be having adverse effects on Virginia agriculture. Increased opportunities to recycle compact fluorescent light bulbs may mitigate concerns about the potential health effects of the mercury the bulbs contain. (Chapter 9)

- Other states use non-general fund sources for waste reduction efforts. With additional resources, State-level coordination of waste reduction and public education activities could be enhanced, and market development could be expanded. Besides the currently-required minimum recycling rates for SWPUs, a statewide goal of lowering per capita waste disposal could be developed. (Chapter 10)

Senate Joint Resolution (SJR) 361 from the 2007 General Assembly Session directs staff of the Joint Legislative Audit and Review Commission (JLARC) to evaluate Virginia's waste minimization,

reuse, and recycling efforts. JLARC staff were directed to consider the effectiveness of State-administered waste reduction programs and the success of waste reduction programs in other, similar states. Additionally, JLARC staff were directed to recommend long-term goals for reducing the amount of waste disposed in the Commonwealth. Concerns about the amount of waste being disposed in Virginia led to the study mandate. In particular, SJR 361 cites limited efforts in Virginia to divert waste for recycling or mulching and funding shortfalls for programs to carry out such efforts.

Waste reduction efforts consist of activities to reduce the amount of waste that is generated (source reduction) and activities to recycle or reuse the waste. Virginia's waste reduction efforts are carried out at both the State and local levels. At the State level, the Department of Environmental Quality (DEQ) is responsible for implementing and enforcing the statutes and regulations guiding Virginia's waste management and reduction efforts. In addition, all State universities and agencies are required to recycle. The *Code of Virginia* allows localities to manage their solid waste independently or as part of a regional partnership. Currently, there are 74 solid waste planning units (SWPUs) in Virginia, comprised of 19 regional SWPUs and 55 independent localities.

In 2007, DEQ reported that the State's 195 permitted solid waste management facilities received more than 23 million tons of solid waste. Of that amount, more than 15 million tons was everyday household and commercial waste, also known as municipal solid waste (MSW). MSW imported from other states accounted for about five million tons of that total.

STATE WASTE REDUCTION EFFORTS REFLECT MIXED PERFORMANCE AS A RESULT OF LIMITED RESOURCES

Virginia has in place a waste management framework premised on reducing the amount of waste disposed in landfills. However, efforts to implement the framework have been limited by a lack of resources.

Virginia Has Implemented a Waste Reduction Framework, but Effectiveness Is Limited

The *Code of Virginia* establishes a framework for managing MSW in Virginia. The framework consists of a waste hierarchy, similar to one adopted by the U.S. Environmental Protection Agency (EPA), that prioritizes waste reduction activities—such as source reduction, reuse, and recycling—ahead of disposal methods. In addition, the framework requires SWPUs to submit comprehensive solid waste management plans to DEQ documenting how waste

will be managed in accordance with the hierarchy. Statutory language also requires all State universities and agencies to implement recycling programs.

The *Code of Virginia* also establishes mandatory recycling rates for all SWPUs. Each planning unit must recycle either 25 or 15 percent of the waste generated in its jurisdiction; the 15 percent rate applies if the SWPU has a population density of less than 100 persons per square mile or has an unemployment rate at least 50 percent higher than the State unemployment rate. Planning units are required to report the amounts of waste generated and recycled to DEQ annually. Also, the planning units must illustrate how they will meet their mandated recycling rate as part of their comprehensive waste management plan.

Implementation of the State's waste reduction framework has been limited by a lack of resources. DEQ dedicates just three of its 102 full-time equivalent positions in waste management to waste reduction activities. The department's review of the SWPUs' waste management plans has been slow, as only part of a position is dedicated to the task. Financial resources are also limited. While approximately $7.5 million was available for solid waste reduction efforts in 2007, nearly 70 percent of this funding—or $5.1 million—was restricted to managing used automobile tires, including illegal tire dumps. The DEQ-administered Litter Prevention and Recycling Grant program provided $1.6 million to localities and nonprofits, but nearly two-thirds of this funding was used for litter prevention activities.

The lack of a single, statewide plan for waste reduction also limits the effectiveness of the State's waste reduction efforts. Development of such a plan could help coordinate and focus current efforts at both the State and local levels.

To improve the availability of funding for local recycling programs, DEQ should identify the appropriate funding levels needed for local recycling and litter prevention activities and report such levels to the General Assembly. The General Assembly may wish to consider creating separate sources of funding for recycling and litter prevention efforts.

Success of State Efforts to Develop Markets for Recyclable Materials Has Been Mixed

While State efforts have helped develop and maintain viable markets for used tires and used lead-acid batteries, State assistance in finding and developing markets for other materials has been limited. Several legislative studies have addressed the importance of markets to the long-term success of recycling programs. The Gen-

eral Assembly created the Virginia Recycling Markets Development Council (VRMDC) to assist with market development and also tasked the Department of Business Assistance (DBA) with assisting in the promotion of recycling industries in the State.

Despite these efforts, respondents to a JLARC staff survey of SWPUs still identified a need for the State to increase its role in developing recycling markets. Many localities report difficulties in finding markets on their own for materials such as glass and certain plastics. Some processors and end users of recyclables in Virginia have indicated a desire for such materials, but have reported that it is difficult to obtain them. Resource constraints have hampered VRMDC and DBA's promotional efforts, and recycling markets in Virginia remain limited for some materials and in some regions. Access to viable markets can be especially difficult for rural localities. States such as Pennsylvania and North Carolina appear to have dedicated more resources than Virginia to developing recycling markets. Pennsylvania allocates significantly more funding to recycling market development and research, and both states assign more staff to these efforts. North Carolina's staff are within a non-regulatory division of its environmental agency, and have developed good working relationships with the state's business community.

State Programs for Tires and Lead-Acid Batteries Benefit From Viable Markets, While Waste Oil Program Is Difficult to Evaluate

Statewide programs to divert used automobile tires and lead-acid batteries from landfills appear to have been effective. However, the effectiveness of a State program promoting the responsible management of used oil, oil filters, and automobile fluids is difficult to evaluate because of a lack of data. A State reimbursement program for end users of used tires has helped create a market for this material. Automotive retailers currently collect a $1 tire recycling fee for each tire sold in Virginia, and funds are used to reimburse tire end users for every ton of tires they manage. Since 1993, DEQ has eliminated approximately 23 million tires from illegal tire piles around the State, while 98 million tires have been diverted from illegal dumps and sanitary landfills since 1994. DEQ estimates that it is on track to eliminate all remaining tire piles in the Commonwealth by the end of 2013 based on current levels of effort.

The State also appears to have stimulated a market for used lead-acid batteries. The *Code of Virginia* prohibits the batteries from being disposed in landfills and requires battery retailers and wholesalers to accept used batteries when selling new batteries. Although data are limited, the national recycling rate for lead-acid batteries has been estimated to be 90 percent, and DEQ staff be-

lieve a similar percentage of batteries are recycled in Virginia. The market for batteries also appears to be strong. According to DEQ staff, many retailers can sell used batteries to secondary lead smelters, and some discount the sale price of a new battery when a used one is returned.

The effectiveness of the State's program to recycle used oil, filters, and automotive fluids is more difficult to determine. Estimates of the extent to which waste oil is being improperly disposed vary widely, but such disposal appears to be declining nationwide.

State Entities Have Recycling Programs, but Guidelines Are Lacking

The *Code of Virginia* requires State entities to develop programs to recycle materials such as office paper, aluminum, and used motor oil as well as to reduce their overall generation of waste. Almost all respondents to a JLARC staff survey of executive branch agencies, legislative branch agencies, and institutions of higher education indicate having developed recycling programs. Although these programs vary considerably in scope and effectiveness, survey respondents reported an average recycling rate of 31 percent. By contrast, only 39 percent of survey respondents indicated having a source reduction or pollution prevention program in place.

Several factors may limit the effectiveness of State entity recycling and source reduction programs. Challenges for those programs identified by respondents to the JLARC staff survey include collection and disposal costs, a lack of storage space for collected materials, and limited access to recycling markets. In addition, guidance for State entities regarding their recycling and source reduction programs appears to be limited. The State has not collected recycling data from State entities since 1995, and model guidelines developed in 1991 for creating and implementing agency recycling programs as required by the *Code of Virginia* are no longer in use. The 1998 General Assembly created a full-time position within the Department of General Services (DGS) to "coordinate state agency recycling and procurement efforts," but funding for the position was not provided, and the position has recently functioned as the department's recycling coordinator, not as a statewide recycling coordinator.

Accuracy and Completeness of Local Recycling Rates Are Affected by Ability to Collect Data at Local Level

SWPUs are required by statute to report an annual recycling rate to DEQ, and the *Virginia Administrative Code* defines how that rate is to be calculated. However, there is no statutory or regulatory guidance for SWPUs on the methods and sources that are to

be used to obtain the data. As a result, the planning units use differing methods and sources to obtain these amounts, and the different approaches used appear to affect the recycling rates reported to DEQ. Planning units that employ more robust data collection methods, such as surveys of local businesses, schools, or institutions, can improve their reported recycling rate by identifying additional amounts of recycled materials. Conversely, planning units not capturing this information may be underreporting the extent of their local recycling effort and reducing the accuracy and completeness of the State's calculated recycling rate.

Additional oversight and verification of the SWPUs' recycling rate data by DEQ could improve the data's accuracy and comprehensiveness. Currently, DEQ staff review local recycling data by comparing reported amounts with figures provided in previous years. However, according to DEQ staff, the department does not have the resources to perform more detailed reviews of submitted data, and JLARC staff found instances in which questionable materials were included in the recycling rates reported by SWPUs. A more formal review process could involve standardizing the amounts of recycled and generated solid waste on a per capita basis to identify extreme or questionable amounts. This could enable staff to help SWPUs improve their data collection methods, identify factors associated with high and low reported recycling rates, and focus assistance on planning units with the greatest potential for improved recycling rates. Verifying and analyzing reported recycling data could be more efficient if an electronic, online reporting system was available to SWPUs. A statewide online reporting system is reportedly used with great success in Tennessee.

To improve the collection and reporting of recycling rate data by the SWPUs, this report recommends that DEQ

- develop standardized templates for data collection and assist SWPUs with the use of such templates,
- implement a formal review process of the reported recycling rate information to ensure accuracy and to use for evaluative purposes for assisting SWPUs, and
- institute an electronic reporting system for recycling rates.

MOST LOCAL RECYCLING PROGRAMS ARE MEETING THEIR RECYCLING MANDATES, BUT THERE ARE OPPORTUNITIES FOR IMPROVEMENT

While a core set of recyclables is collected throughout the State, local recycling programs differ in important ways. For example, programs differ in the amount of spending on waste reduction efforts and the methods used to collect recyclable materials. According to

survey data, curbside collection is more common in urban parts of the State, while rural localities primarily use drop-off sites. Also, whether localities manage their programs independently or through a regional partnership appears to have some influence on recycling rates. Localities also differ in the extent to which mandates and incentives available through the *Code of Virginia* are used to promote recycling.

Overall, SWPUs appear to be achieving some success developing local-level waste management plans and in recycling waste. All 74 SWPUs in Virginia have submitted solid waste management plans to DEQ, and these plans appear to represent good-faith efforts by the planning units to manage their MSW consistent with the waste hierarchy adopted by DEQ.

In 2007, the recycling rates reported by SWPUs averaged 33 percent statewide, and with credits allowed by statute, averaged 38.5 percent. (Recycling credits are given for source reduction programs, recycled non-MSW, reuse of solid waste, or landfill disposal of certain non-metallic substances and organic wastes that have been separated from recyclable materials.) In addition, more than 85 percent of the 74 SWPUs met or exceeded their mandated recycling rates in 2006 and 2007. Some planning units exceeded their mandate by substantial margins. The ten SWPUs reporting the highest recycling rates in 2007 comprised more than 23 percent of the State's population, or approximately 1.8 million people, and accounted for roughly 20 percent of the total MSW generated in Virginia in 2007. These ten SWPUs were generally located in heavily populated parts of the State, such as Northern Virginia, the Richmond-Central Virginia region, and Tidewater.

A Subset of SWPUs Consistently Struggles to Meet State Recycling Mandates

Eight SWPUs reported recycling rates in 2007 that did not meet their mandated rate. (Eleven and eight SWPUs reported not meeting their mandated rates in 2006 and 2005, respectively.) These eight SWPUs account for less than three percent of the State's total population and produced approximately three percent of the total MSW generated in Virginia in 2007. An analysis of 2007 recycling rate data suggests that an additional six SWPUs reported base recycling rates at least eight percentage points less than the rate which might be expected relative to their characteristics, such as population density.

Most of the eight SWPUs reporting low recycling rates in 2007 have consistently struggled to meet their mandated recycling rates. These planning units operate similar recycling programs and appear to face similar challenges in recycling solid waste. Six

of the eight planning units have population densities near or below 100 persons per square mile, qualify for the 15 percent mandated rate, and rely mainly on drop-off sites to collect recyclable materials. In addition, only one of the eight manages its recycling program through a regional partnership.

Best Practices Could Improve the Performance of Local Recycling Programs

Although Virginia reported a 38 percent recycling rate in 2007 and most SWPUs met or exceeded their minimum rates, there are opportunities to improve local recycling programs throughout the State. Examples of best practices include targeting a high percentage of the waste stream, making recycling more convenient and easy, and partnering with localities to manage recycling programs through regional bodies.

IN SUM, STATE AND LOCAL EFFORTS AT WASTE REDUCTION REFLECT STRENGTHS AND WEAKNESSES

The extent to which waste reduction should receive greater State attention is a policy choice. This review of the State's current efforts at waste reduction has revealed areas of strength, but also areas where the State's performance is mixed or weak. The table on the next page is a snapshot of strengths and weaknesses at the State and local levels.

The State has adopted waste management objectives similar to EPA's and some other states, established planning and reporting requirements, and established a minimum recycling requirement at the local level. Additionally, State financial assistance regarding the collection and recycling of waste tires and the adoption of a landfill ban on lead-acid batteries have successfully prevented much of these materials from being landfilled or illegally disposed. However, efforts in other facets of the State's waste reduction program have not been as effective. The priority given to waste reduction activities by DEQ has been limited by the availability of resources to complete such tasks. Review of comprehensive waste management plans has been slow because few resources have been available, according to DEQ staff. No single waste management planning document has been developed that identifies the State's long-term plans and corresponding measurable goals.

Waste reduction efforts at the local level can be characterized as relatively strong. As the table illustrates, planning, compliance with recycling mandates, and the use of regional partnerships have helped the State meet its recycling goals. However, eight

Virginia's Waste Reduction Report Card		
Performance is… + Relatively strong ± Mixed − Relatively weak		
	Rating	**Comments**
State Role		
Policy	+	State statutory language addressing waste reduction is in place, and provides for solid waste planning units (SWPUs), local plans, reporting of recycling data, and minimum local recycling rates with an acknowledgement of some population density differences.
Planning	−	The State's focus has been on ensuring local plans are developed. However, there is no single, comprehensive, statewide plan. There are no measurable goals for the future (beyond maintaining the current minimum recycling rates).
Resources and DEQ Priority	±	State resources dedicated to waste reduction have been minimal and impact the priority level given by DEQ. Review of solid waste unit plans has been slow. There is little public outreach. However, the extent to which the State should push waste reduction is subject to differing perspectives.
Material-Specific Programs	+	The waste tire program appears to have succeeded by developing and supporting markets for the material. The lead-acid battery program success is due to already robust markets and the State's landfill ban. Data limitations make it difficult to evaluate the waste oil program.
Assistance With Markets and Research	−	The need to develop recyclable markets has been recognized since 1989, but State assistance in finding and developing markets has been limited.
Guidance for State Agencies	−	Guidelines for State entities that were in place fell out of use when DEQ was reorganized in 1995, and State agency reporting on their recycling activity ceased.
State Agency Recycling	±	Most State agencies responding to a JLARC staff survey indicate having a recycling program in place. Additional recycling of some materials named in the statute could be done by some agencies.
State Agency Source Reduction	±	Only 39 percent of responding State entities indicated that they have a source reduction program, while 61 percent have not implemented one.
Analysis/ Accountability	−	DEQ obtains and reviews data reported by localities and regional bodies on MSW, but more should be done to ensure consistency in the data reported, to examine per capita waste disposal levels, and to determine the SWPUs with the greatest untapped potential for further waste reduction.
Local Role		
Planning	±	All SWPUs have submitted plans to DEQ. Plans appear to represent good faith efforts. However, some localities have been slow in submitting materials to DEQ.
Compliance With Recycling Mandate	+	66 of the 74 SWPUs met or exceeded their mandated recycling rate in 2007 and 63 met or exceeded it in 2006. Some planning units appear to have substantially exceeded their mandated rate.
Consistency of Efforts Across SWPUs	−	Some SWPUs do not meet their mandated recycling rates and other planning units are recycling at levels well below their peers. Relatively few localities use ordinances or financial incentives.
Regional Partnerships	+	83 localities with 51 percent of Virginia's population are managing their solid waste and recycling services through a regional SWPU. Regional units appear to achieve somewhat higher recycling rates.
Curbside Recycling and Other Best Practices	±	Curbside collection programs are being used in many but not all population-dense locations. In some localities, curbside service could be expanded. Public outreach and other best practices could be utilized in some locations to a greater extent.

planning units in 2007 and 11 planning units in 2006 did not meet their recycling rates, and not all localities are using the powers to require recycling-related activities provided by the General Assembly that may allow further improvements in the State's waste reduction efforts.

LEGISLATIVE CONCERNS ABOUT BEVERAGE CONTAINERS, PLASTIC BAGS, AND COMPACT FLUORESCENT LIGHT BULBS

During the 2008 General Assembly Session, questions were raised about the effectiveness of beverage container laws as a waste reduction strategy and the potential effects of improperly disposed plastic bags and compact fluorescent light bulbs (CFLs) on human health and the environment. JLARC staff were asked to consider such questions.

This review found that in states where beverage container laws have been adopted, it appears that litter is reduced as a result; however, evidence is lacking that overall recycling rates are improved. Local and state efforts have been initiated to address the issue of plastic shopping bags, which when improperly disposed can become problems for the environment, including agricultural production. Public and private recycling programs may help reduce the potential risk of CFLs, which contain a very small amount of the harmful element mercury.

FUTURE WASTE REDUCTION GOALS AND EFFORTS COULD BE EXPANDED

Virginia landfills currently receive a substantial amount of waste, due to a high in-state per capita disposal level of more than a ton of waste per year, coupled with the receipt of substantial amounts of out-of-state waste. The extent to which the State allocates its resources to waste reduction activity, however, is a policy choice.

The State has a useful statutory framework in place for promoting waste reduction. Given that the State's level of effort to help implement the framework is currently modest, it appears to be appropriate to at least maintain that existing level of effort.

However, JLARC staff have identified possible areas for enhancements in the State's role if the State chooses to give waste reduction efforts a higher priority. Other states have developed funding for waste reduction activities without relying upon state general fund appropriations—for example, through a surcharge on tipping fees (tipping fees are charges levied by waste management facilities to cover their operating, maintenance, and other costs). If additional resources are available, potential improvements could be made to current State and local efforts. For example, creating and

funding a recycling coordinator position at DEQ to assist State entities and local governments with their recycling program and materials marketing needs could help improve the State's overall recycling rate. The cost of providing such a position may range between $54,000 and $112,000, including salary and benefits. Such a position could be responsible for developing State agency guidelines, providing more assistance to localities, working with localities and recyclable materials end users to identify markets, and reviewing recycling rate data in order to improve its accuracy and identify opportunities for increased performance. Other improvements could include expanding the currently limited resources and efforts at public education and outreach. The State could also increase the level of funding it makes available to localities and planning units to help administer their recycling programs.

Virginia could choose to address its future waste generation and disposal situation by (1) periodically revising the recycling rate requirement and setting goals that take into account population density levels, and (2) adopting a waste disposal reduction goal that seeks to curb the amount of waste disposal over time. Several other states, including North Carolina and West Virginia, have already adopted measures and goals which address the amount of waste being disposed. In adopting such a goal, the State could identify a per capita amount of waste disposed to use as a standard or baseline, and then set a goal to dispose of no more than or less than that amount in the future.

The goal of waste reduction is to minimize the amount of waste that is disposed. This goal is most directly achieved by using a measure of that amount rather than a recycling rate. The amount of waste disposed is a function of the amount of waste generated and the amount recycled or reused. Therefore, the recycling rate may increase, but if the amount of waste generated also increases, the amount disposed may not be decreased. A waste reduction goal would capture the success of Virginia's waste reduction efforts besides recycling, such as source reduction activities. Such a goal is also measurable using data that is already collected and reported.

To decrease the generation and disposal of MSW in Virginia over the long term, this report recommends that

- the General Assembly consider levying a surcharge on the amount of MSW being disposed of in Virginia's permitted waste management facilities,
- the General Assembly consider directing DEQ to periodically assess and update the current recycling requirements, and
- DEQ identify goals and strategies for reducing the amount of waste produced in Virginia on a per capita basis.

Chapter 1

Overview of Waste Reduction

Concerns about the management of solid waste in Virginia have surfaced multiple times over the last 30 years. Those concerns have frequently focused on whether the Commonwealth has adequate landfill capacity to manage the waste it generates and imports from other states.

Senate Joint Resolution 361 of the 2007 General Assembly, the mandate for this review by the Joint Legislative Audit and Review Commission (JLARC), expresses concern about landfill capacity in the Commonwealth (see Appendix A). In addition, the resolution states that "waste minimization and reuse through recycling and reclamation are higher preferred alternatives" to incineration or disposal in landfills, but indicates that recycling and reclamation may not be receiving adequate attention. The resolution states that "the Commonwealth has not adopted a long-term plan to reduce waste that incorporates minimization alternatives" and that "current waste reduction programs at the state and local levels face funding shortfalls and are unable to fully execute their missions."

Based on these concerns, the resolution directs JLARC to study the effectiveness of Virginia's current waste reduction programs and policies. JLARC is also asked to identify successful waste reduction programs in other, similarly-situated states, and to recommend long-term goals for waste reduction in Virginia. For this review, JLARC staff interviewed state agency staffs involved with waste reduction in Virginia and selected other states, surveyed staffs at local recycling programs and State agencies, reviewed solid waste management planning files, and conducted a review of the literature (see Appendix B).

Solid Waste and Municipal Solid Waste

Municipal solid waste (MSW) is composed of materials generated by households, commercial enterprises, and institutions. MSW consists of everyday items such as product packaging, grass clippings, bottles, food scraps, newspapers, appliances, paint, batteries, furniture, and clothing. Solid waste consists not only of MSW but also waste from construction and demolition activities, industrial processes, waste incinerators, and other sources.

MANAGEMENT OF SOLID WASTE IN VIRGINIA

Waste reduction encompasses all activities that reduce the amount of solid waste going to a landfill or combustion facility—reducing waste at its source (source reduction) and the recycling, reusing, and composting of some materials. The largest component of solid waste in the State and the nation is municipal solid waste (MSW). MSW is composed of materials produced every day by households, businesses, and institutions. Most waste reduction activities in Virginia focus on MSW, and unless otherwise specified, waste reduction in this report refers to reduction of MSW.

Although this review focused on MSW, construction and demolition debris (CDD) is another substantial component of solid waste.

Construction and Demolition Debris

Construction and demolition debris (CDD) consists of the debris generated during the construction, renovation, or demolition of buildings, roads, and bridges. CDD materials often are bulky and heavy and include concrete, wood (from buildings), asphalt (from roads and roofing shingles), bricks, glass, and other materials.

The U.S. Environmental Protection Agency (EPA) estimated that about 325 million tons of CDD were generated in the United States in 2003, with the top three materials being concrete, wood, and drywall. EPA and some states are beginning to focus more on CDD recycling, and at least two CDD recycling facilities have opened recently in Virginia.

Virginia's Permitted Facilities Received More Than 23 Million Tons of Solid Waste in 2007

According to the Virginia Department of Environmental Quality (DEQ), more than 23 million tons of solid waste were received at 195 permitted waste management facilities in Virginia during calendar year 2007 (Table 1). The largest amount of solid waste received at these facilities was MSW, almost 15.9 million tons. Construction and demolition debris (CDD) accounted for the next largest volume of material, more than four million tons. Virginia currently has no permitted hazardous waste disposal sites.

Table 1: Solid Waste Disposed in Virginia's Permitted Facilities (2007)

Type of Solid Waste	Amount (in Tons)	Percentage
Municipal Solid Waste	15,887,571	68%
Construction/Demolition Debris	4,314,467	18
Industrial Waste	1,050,478	5
Incineration Ash	626,538	3
Vegetative/Yard Waste	578,714	2
Other[a]	931,611	4
TOTAL	**23,389,379**	

[a] Includes other wastes, sludge, petroleum-contaminated soil, tires, white goods (appliances), regulated medical waste, and friable asbestos.

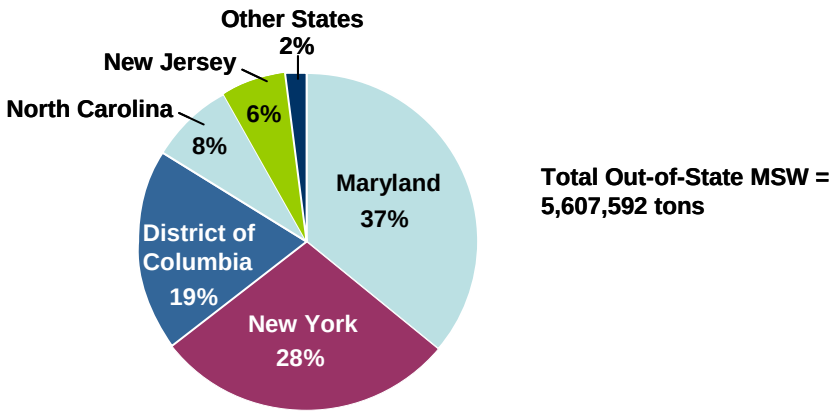
Source: DEQ, *Solid Waste Managed in Virginia During Calendar Year 2007.*

Virginia's permitted facilities accept a substantial amount of out-of-state waste. Of the 15.9 million tons of MSW received by permitted facilities in 2007, out-of-state waste accounted for more than one-third of the total, at 5.6 million tons. As shown on Figure 1, almost two-thirds of that out-of-state MSW was from Maryland and New York (37 and 28 percent, respectively).

Most Solid Waste Goes to Landfills

Permitted waste management facilities in Virginia include landfills, incinerators, materials recovery facilities (MRFs), and transfer stations. Virginia currently has 60 active permitted sanitary landfills and 11 incinerators. Three of the 11 incinerators are owned by the federal government and do not accept public waste,

Figure 1: Majority of Out-of-State MSW From Five Jurisdictions (2007)



Source: DEQ, *Solid Waste Managed in Virginia During Calendar Year 2007.*

and six of the 11 are energy recovery facilities, which means that heat from the incineration process is used to produce energy. Figure 2 (next page) shows the active, permitted sanitary landfills and incinerators in Virginia as of April 2008.

Waste Management Facilities in Virginia

Sanitary landfills accept primarily MSW but also may accept CDD and other types of waste. Other types of landfills accept only CDD or industrial waste.

Materials recovery facilities receive and sort solid waste, recovering materials for recycling or direct marketing to end users.

Transfer stations are holding areas where waste is unloaded from smaller vehicles onto larger vehicles for shipment to a disposal facility.

Landfilling is the primary disposal method in Virginia. In 2007, approximately 15.9 million tons (about 70 percent) of the waste managed in Virginia was landfilled. (DEQ's annual report on solid waste noted that 82 percent was landfilled in 2007; however, this percentage is not based on the entire 23.4 million tons of waste received at waste management facilities.) Another two million tons (about 11 percent) was incinerated and turned into ash.

Other methods of waste management include recycling, mulching, and on-site composting. Some of these activities occur at MRFs. Most recycling in Virginia, however, occurs at non-permitted facilities. There are an estimated 21 recycling facilities in the State (see Appendix C) where recyclables are received that have been presorted from MSW collected from residential (curbside recycling or drop-off centers) or commercial sources (cardboard and office paper collection programs).

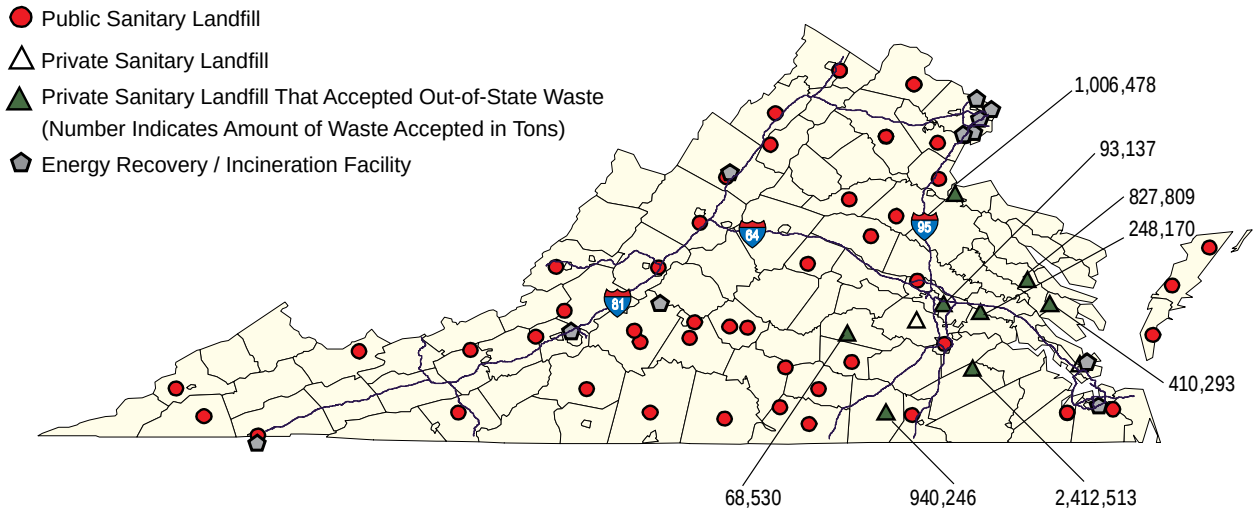
Private Landfills Accept Majority of Out-of-State Waste and Have More Capacity Than Public Landfills

Regulations implemented in the late 1980s substantially increased landfill operating costs. As a result, large regional landfills that can address such costs were constructed, primarily by private companies. Ten of the 60 sanitary landfills in Virginia are privately owned, and all are located near or east of I-95. Eight of

those ten sanitary landfills accepted the majority (6 million tons, or 84 percent) of out-of-state waste in 2007 (Figure 2). Another 12 percent went to privately owned CDD landfills and incinerators.

Private and public landfills differ in several ways. In Virginia, private landfills have more capacity than public landfills. The average remaining capacity of a private landfill in Virginia is 38 years, more than two-and-a-half times as much as the average remaining capacity of a public landfill (14 years). Private landfills also can often offer lower tipping fees than public landfills. (Tipping fees are charges levied by waste management facilities to cover their operating, maintenance, and other costs.) In 2001, the Metropolitan Washington Council of Governments conducted a survey of private landfills in Virginia and reported tipping fees ranging from $34 to $48 a ton. The council's report acknowledged that those fees were likely much higher than the price most haulers pay. Operators of private landfills can negotiate tipping fees with private haulers, or may themselves employ the haulers. In addition, private landfill operators, unlike local governments, do not have to provide other governmental services to their customers.

Figure 2: Sanitary Landfills and Incinerators (2008) and Out-of-State Waste Accepted at Private Sanitary Landfills (2007)



Source: Data from DEQ; GIS dataset from Virginia Economic Development Partnership.

MUNICIPAL SOLID WASTE GENERATED AND RECYCLED IN VIRGINIA

Providing for the collection and disposal of solid waste is typically a locality responsibility. Federal involvement mainly focuses on establishing nationwide objectives and developing regulations for landfill siting and design. State law establishes State and some lo-

cality responsibilities concerning waste disposal. Localities are required to draw up and implement plans for managing the flow of trash in their jurisdictions, including recycling a portion of it.

Currently, such planning is done by 74 solid waste planning units (SWPUs). Fifty-five Virginia localities serve as their own SWPU, while the remaining localities have chosen to regionalize their waste management efforts and are represented by 19 SWPUs. SWPUs are required to meet either a 25 or 15 percent recycling rate, depending on their population density or unemployment levels. The planning units are required to report information to DEQ on waste that is generated and recycled within their boundaries.

Waste Generated Per Capita in Virginia Appears Higher Than National Average

Waste that is generated may be recycled, reused, or disposed. The SWPUs reported recycling or disposing of 8.8 million tons of MSW generated in their jurisdictions in 2007. This amount represents about 1.14 tons per capita. The per capita tonnage in 2006 was 1.21. These per capita figures indicate that Virginians may be generating waste at rates higher than the national average. According to data reported by EPA, in recent years average MSW generation levels nationally have been about 0.84 tons per person per year. However, differences in the type of waste that is considered MSW between Virginia's planning units and EPA may account for differences in per capita disposal rates.

Virginia Reported Recycling 38 Percent of its Waste in 2006 and 2007

Recycling describes the process of collecting, sorting, processing, and converting discarded materials into new materials for use in the production of new products. Source reduction entails using less materials in the production or manufacturing process to reduce the amount of waste generated by the process. Source reduction efforts are primarily voluntary while some state and local governments, including Virginia, have recycling mandates. Federal, state, and local governments have made recycling and source reduction efforts a priority in some of their own operations in order to encourage such efforts; however, these priorities mostly serve as guidelines, not requirements.

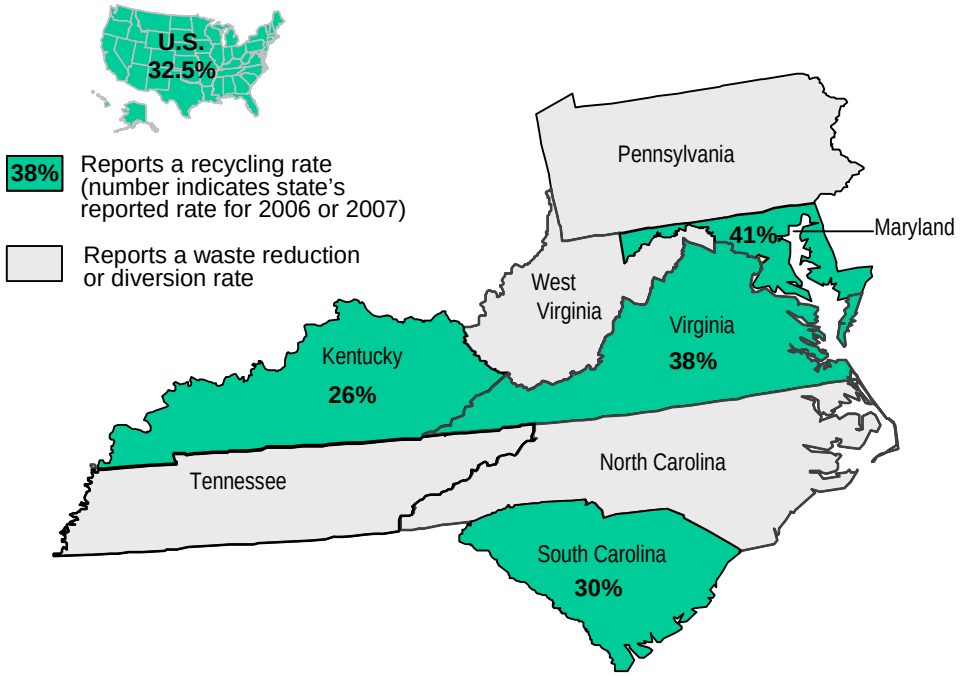
Based on data reported by the SWPUs, DEQ reported that Virginia's recycling rate was 38 percent in both 2007 and 2006. Because of a lack of reliable data, long-term trends in the percentage of waste that is recycled or otherwise diverted from disposal cannot be determined. However, since 2004, Virginia's recycling rates

have risen by eight percentage points, with about 30 percent of waste reported recycled in 2004 compared to 38 percent in 2007.

When compared to certain nearby states, the recycling rate reported by Virginia ranks behind only Maryland, and is higher than the national rate reported by the EPA (Figure 3). These comparisons should be made with caution, however, because the states shown on the map and the EPA do not have a uniform approach to calculating a recycling rate, and four states near Virginia do not currently report a recycling rate. Some states in the nation, including Maryland, North Carolina, Tennessee, and West Virginia, have set waste reduction or diversion goals, which measure a broader range of activities than just recycling.

The recycling rate that is achieved in Virginia stems from the successful recycling of many different materials. Paper (918,000 tons), metal (762,000 tons), and yard waste (568,000 tons) accounted for the greatest amount of material diverted for recycling in Virginia in 2007. (Appendix D identifies materials that comprise paper, metal, yard waste, and other materials. Appendix E represents some materials that have been identified as having recyclable properties and/or uses. The appendix also identifies the extent to which these materials are currently recycled in the State, and whether the localities responding to a JLARC staff survey indicated a market existed.)

Figure 3: Reported Recycling Rates of Virginia, Nearby States, and the Nation



Source: U.S. EPA and state agency solid waste reports.

POTENTIAL BENEFITS AND COSTS OF RECYCLING

Recycling materials that would otherwise be disposed offers a number of potential benefits, according to some research. It can lead to substantial savings in landfill capacity, money (in the form of avoided disposal costs), and energy that would be used to manufacture a product from virgin materials. Recycling may also help protect both natural resources and public health, by avoiding potential negative impacts of landfills and incineration. Aside from needing large amounts of land, landfills are the single largest source of methane gas in the United States and have the potential to be a source of groundwater contamination. Incinerators require less land but produce toxic air emissions (which are regulated by EPA), and the ash residue from the burning still has to be landfilled. Recycling may also result in reduced carbon emissions. EPA estimates that in 1996, recycling of solid waste in the United States prevented the release of 33 million tons of carbon into the air—roughly the amount emitted annually by 25 million cars.

In addition, some polling data has indicated that citizens view waste reduction efforts, including recycling, as the "right thing to do." In light of the potential benefits and the public's desire to recycle, advocates have argued that government should provide recycling programs even when the private sector will not.

Recycling Collection Systems

Drop-off collection programs utilize fixed locations for collecting recyclable materials and are more common in rural areas. Curbside collection programs are typically provided in urban and suburban areas and involve personnel in specialized vehicles picking up materials set out by households.

Critics of recycling have noted that some recycling activities may add to costs and waste energy. For example, a recycling program may require making two waste collection runs over the same route, resulting in increased fuel use and carbon emissions. Critics of mandatory recycling programs often base their arguments on the existence or absence of markets for recycled materials. They assert that if the material being collected for recycling was in fact valuable, a collection program would already be in place. For example, critics argue, there are longstanding, non-mandatory collection programs for materials such as paper and metals.

The extent to which recycling is beneficial appears to depend on local circumstances and market forces. A 2005 review by the Federal Reserve Bank of Minneapolis assessing recycling program costs in the upper Midwest reported that "recycling may not always be justifiable on economic grounds" because localities face different situations.

From a locality's economic perspective, there are at least three financial benefits of recycling. First, recycling can lengthen the life of a landfill. Second, certain materials collected through recycling programs have value and can be sold for a profit or at an amount that will help offset the cost of collection. Third, collection of recyclable material reduces the overall cost associated with landfilling

or incinerating the material. When viable markets exist and landfilling is costly, conditions are right for implementation of a successful recycling program.

These factors tend to be stronger or more prevalent in urban rather than rural areas. For example, in an area with a high population density, curbside collection is likely going to result in volumes of material large enough to attract processors. In addition, such an area is likely to have to send its waste somewhere else for disposal because of the high price of land. Under such circumstances, a recycling program makes economic sense. However, in a rural area where the population is spread over a large area, the cost of a collection program is likely to outweigh the prices a locality could receive for its material. This is true even though rural areas are more likely to have drop-off rather than curbside collection programs. Furthermore, the greater the distance the material has to be transported, the lower the profit for the locality. At the same time, the price of land may be such that landfilling the material makes more sense from an economic standpoint, especially if a locality has limited resources for competing objectives such as schools and law enforcement.

There are some limitations to this argument. For example, it does not consider the desire of the community's citizens to have such a program. Also, the Federal Reserve Bank report indicated that costs of collecting and processing materials are starting to fall as a result of increased participation in recycling and more automated collection systems, making recycling more competitive with land disposal. In addition, actual costs of landfilling are often underestimated because most households in the United States are not charged for the amount of waste they dispose of but rather a flat rate that is unrelated to the household's disposal patterns.

LEGISLATIVE CONSIDERATION OF WASTE MANAGEMENT AND WASTE REDUCTION PRACTICES

Since 1970, agencies and commissions of the Commonwealth have produced over 50 legislative reports studying elements of waste management and waste reduction. These reports generally were either reviews of waste management or waste reduction, studies of specific issues, or annual or regular reports of existing programs. Multiple bills have been introduced for the General Assembly's consideration, including bills to require a deposit on beverage containers and to restrict the importation of out-of-state trash. In 2008, nine bills concerning waste reduction were introduced.

Studies Have Identified Difficulties Virginia Localities Face in Implementing Waste Reduction Efforts

A comprehensive review of waste management was produced in 1970. The study recommended that the Commonwealth undertake a structured and regulated approach to solid waste management and give the Department of Health the authority to permit and regulate locality-operated solid waste facilities. Eight subsequent comprehensive studies of solid waste management were produced between 1982 and 2001. Key findings of these studies, which are likely still influencing waste reduction activities in Virginia, included the following:

- Localities have difficulties identifying and utilizing markets for their recyclable materials.
- Localities receive limited or no financial assistance to achieve the State's mandated recycling rates.
- Localities need guidance on consistent measures and computation methods to determine waste management costs.

Other studies have focused on the recycling of specific materials, motor oil disposal, hazardous waste disposal, bottle bills, State agency procurement, recycling markets, flow control and waste trade, and landfill siting.

Nine Bills Concerning Waste Reduction Were Introduced in 2008

Waste reduction efforts were again before the General Assembly in 2008. Nine bills were introduced dealing with waste reduction, including recycling requirements and bans on the disposal of certain products or materials in landfills (Table 2).

In addition, three study resolutions were withdrawn in exchange for consideration in this JLARC report. The three study resolutions requested that

- DEQ convene a study group to report on potential legislative actions that would mitigate the negative effects of improperly disposed of plastic bags on the environment;
- Virginia Recycling Markets Development Council study the costs and benefits of establishing a statewide program for recycling compact fluorescent bulbs that contain mercury; and
- JLARC include in its review an analysis of the effectiveness of the recovery and recycling of beverage containers as a waste minimization strategy.

Table 2: Waste Reduction Legislation Introduced During 2008 General Assembly

Bill	Description	Most Recent Action
HB 343	Permits localities to ban the disposal of cathode ray tubes in public or privately owned landfills in their jurisdiction provided a recycling program for such materials exists	Enacted
HB 344	Requires manufacturers of more than 500 items of computer equipment to adopt and implement a recovery plan providing for the reasonably convenient collection, recycling, and reuse of computer equipment	Enacted
HB 1398/ SB 665	Extends, until July 1, 2011, the $1.00 recycling fee imposed on each new tire sold	Enacted
HB 1533	Bans the disposal of covered televisions and component parts as solid waste effective January 1, 2009. Manufacturers shall pay a $5,000 fee to assist localities with establishing television recycling programs	Continued to 2009
HB 1548	Prohibits publicly owned sanitary landfills from accepting three or more tons per hauler trip of recyclable construction and demolition debris if there are recycling facilities available or construction and demolition landfills in the area	Continued to 2009
HB 1549	Requires all "on-premises" licensees of the Virginia Alcoholic Beverage Control Board to recycle their glass containers, if the locality in which they are located is within 50 miles of a recycling center	Left in Committee
SB 648	Requires DEQ to (i) conduct a statewide management outreach program for used motor oil, filters, and other auto fluids; (ii) maintain a Statewide database of locations accepting these materials, and update this database at least annually; (iii) create, maintain, and promote a toll-free hotline number and website where consumers may receive information regarding how and where to recycle these materials; (iv) establish an ongoing outreach program to current and potential collection centers; and (v) provide signs to retailers of these materials that encourage the environmentally sound management of these materials, and provide the toll-free hotline number and website address. Also requires retailers of these materials to post these signs provided by DEQ	Enacted
SB 650	Repeals provision providing a tax credit for equipment used exclusively for burning waste motor oil at a business facility	Continued to 2009

Source: JLARC staff.

Chapter 2

Federal, State, and Local Roles in Waste Management

In Summary

Since the late 1960s, federal and then State laws have regulated landfill siting and design, and since the 1990s, federal and State goals have encouraged waste reduction over disposal. The Department of Environmental Quality oversees the State's waste reduction program, dedicating three full-time staff to administer five programs, including two grant programs. In 2007, State expenditures for waste reductions programs totaled approximately $5.1 million; most of the funding comes from three taxes and a tire fee. The responsibility for solid waste management, including recycling and other reduction efforts, lies with local governments. In Virginia, localities can form regional solid waste planning units to meet State mandates for developing solid waste management plans and for achieving a 25 or 15 percent recycling rate, depending on population density or unemployment rates. Local waste reduction programs vary widely, and some localities derive substantial revenue from landfills and lack control over private waste management operations in their jurisdictions.

A number of legal requirements and goals have been established by both the federal and Virginia governments to increase waste reduction (Appendix F). In addition, Virginia localities have been granted certain authorities to improve waste reduction activities in their jurisdictions, and some localities encourage recycling by providing curbside collection for households or drop-off sites.

FEDERAL ROLE IN WASTE MANAGEMENT

Passage of the Solid Waste Disposal Act (SWDA) in 1965 marked the first federal involvement with solid waste, which to that point had been a function of state and local governments. Until that time, open burning and dumping still constituted acceptable waste disposal methods. Additionally, landfills had been constructed without health and environmental protections, such as daily cover to prevent animal encroachment or liners for groundwater protection. The 1965 act attempted to foster the creation of state programs for managing solid waste disposal by providing research grants to states and localities.

Amendments to SWDA in 1976 became known as the Resource Conservation and Recovery Act (RCRA). RCRA, which was amended in 1980 and 1984, established the federal role in solid waste management. The act includes the following primary goals:

- protection of human health and the environment from the potential hazard of waste disposal;
- conservation of energy and natural resources;
- reduction of the amount of waste generated; and
- assurance that waste management occurs in an environmentally sound manner.

EPA's Office of Solid Waste administers RCRA objectives and requirements by setting national environmental goals, providing environmental education information, and writing certain regulatory standards. States must adopt RCRA standards, at a minimum. Despite the requirement for states to implement such programs, Congress provides little, if any, direct funding to the states for such purposes.

EPA has not promulgated regulations dictating how solid waste should be managed, with some exceptions regarding landfill design and operation. Instead, solid waste is primarily regulated by states and municipalities and managed at the local level. For example, State regulatory agencies issue solid waste permits and perform oversight of the landfills. EPA does provide technical assistance to the states, conduct research, and encourage reuse and recycling.

Source Reduction

Source reduction refers to any change in the design, manufacture, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they become municipal solid waste. Source reduction also refers to the reuse of products or materials.

A 1989 EPA task force report recommended implementing "integrated waste management" systems to address increasing pressure on landfill capacity. The report proposed a hierarchy of waste management alternatives comprised of four parts: source reduction, recycling (including composting), combustion, and finally, disposal in landfills. Also in 1989, EPA set a national recycling goal of 25 percent. That goal was reached in 1996 and a revised goal of 35 percent was established. It is important to note that EPA, Virginia, and many other states use slightly different methods of calculating recycling rates.

DEQ'S WASTE REDUCTION PROGRAM

The Virginia Department of Environmental Quality (DEQ) oversees the State's waste reduction program, which has evolved in State statute and regulations over a 38-year period. Today, DEQ dedicates staff and financial resources to implementing the State's waste reduction program.

Virginia's Legal Framework for Waste Reduction Activities

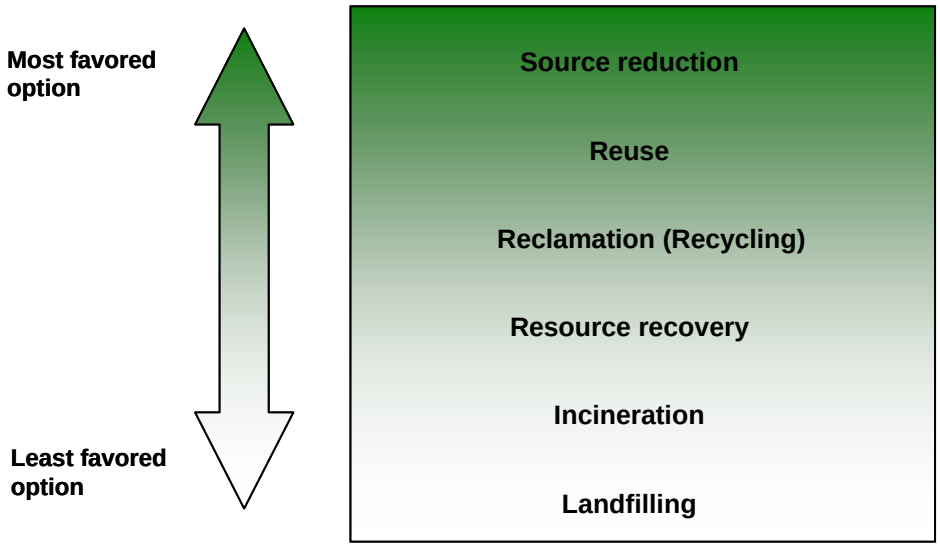
Formal State involvement with trash disposal dates back to 1970 when the Board of Health was given the power to regulate localities' garbage disposal. Prior to this date, open dumping and burn-

ing of garbage were common practices. In 1976, the Virginia Litter Control Act was implemented and the Department of Conservation and Historic Resources was given the authority to conduct a program to ensure the act's objectives.

In 1986, the Virginia Waste Management Act (VWMA) was adopted and the Department of Waste Management created. VWMA (§10.1-1400 *et seq*.) establishes the standards and requirements for solid waste management in the Commonwealth. The department and its regulations were consolidated into the new Department of Environmental Quality in 1993. DEQ is the lead agency for administering the State's waste management programs under the act, and the Virginia Waste Management Board, made up of seven gubernatorial appointees, provides regulatory oversight of waste management activities. VWMA encompasses federal standards created by RCRA and the Comprehensive Environmental Response, Compensation, and Liability Act, also known as Superfund.

The 1993 General Assembly enacted legislation establishing a waste management hierarchy for comprehensive waste management in the State, similar to the priorities established by EPA. The State hierarchy, which was also promulgated in regulations, ranks the following components in order of desirability: planning; source reduction; reuse; reclamation; resource recovery (incineration that captures the energy produced); incineration; and landfilling (Figure 4). According to DEQ staff, the hierarchy drives waste management policy decisions.

Figure 4: Virginia's Waste Management Hierarchy



Source: JLARC staff graphic of *Code of Virginia* Section 10.1-1425.11 and 9VAC20-80-30.

VWMA, as well as past and present executive orders, requires entities of State government to participate in recycling efforts. For example, the act mandates State agencies, including those of the General Assembly, and Virginia's universities to establish programs for collecting recyclable materials they use. In addition, these entities are also required to use recycled materials where feasible. Executive orders have also been used to promote the use of recycled material. Executive Order 48 (2007) directs the Commonwealth to purchase recycled paper when feasible and office equipment that is compatible with recycled paper.

VWMA requires localities and/or regional bodies to develop solid waste management plans to address waste reduction, recycling, storage, and disposal. As noted in Chapter 1, such planning is currently done by 74 solid waste planning units (SWPUs). Nineteen SWPUs represent counties, cities, and towns that have chosen to regionalize their waste management efforts, including the Central Virginia Waste Management Authority, which includes 13 localities, and the Southeastern Public Service Authority that serves eight localities.

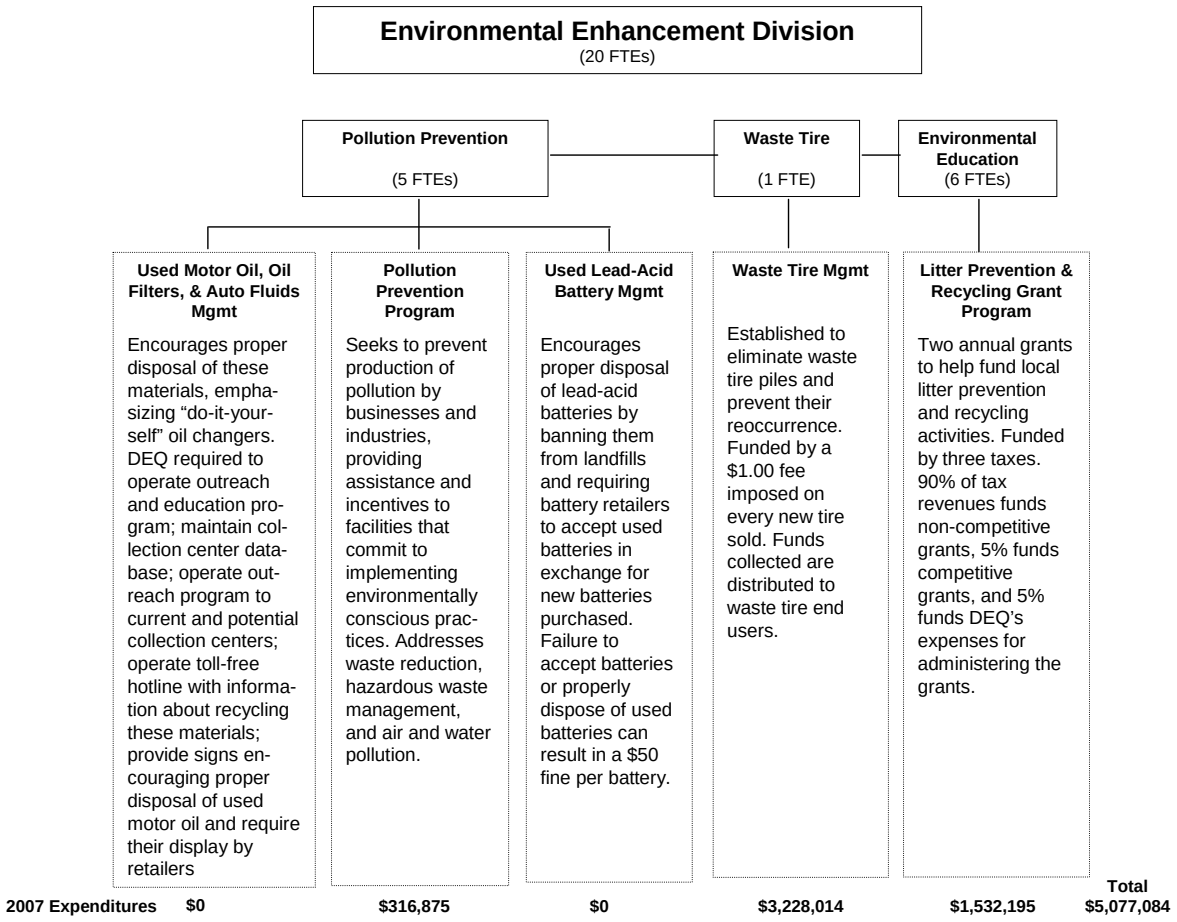
VWMA requires SWPUs to maintain a recycling rate of either 25 percent or 15 percent. The 15 percent recycling rate applies if the SWPU has either (1) a population density of less than 100 persons per square mile, or (2) an unemployment rate for the preceding calendar year that is at least 50 percent greater than the State average. The lower 15 percent rate was enacted by the 2006 General Assembly to address issues some localities were having in finding markets for their materials. Localities that combine to form a single SWPU are able to combine their individual recycling rates and report an average rate for all. Although a majority of the planning units qualify for the lower rate, most of the State's population resides in SWPUs subject to the higher rate.

Staffing and Funding of DEQ's Waste Reduction Efforts

DEQ's Waste Division, which is organized within the department's central office and is responsible for waste management, has 85 full-time equivalent staff positions (FTEs). Waste Division offices allocate the majority of their time to activities such as permitting and inspecting solid waste facilities, regulating solid waste and hazardous waste, and assessing potentially contaminated sites. A few personnel in these offices may contribute some time to reduction efforts, but this is not their focus.

The Environmental Enhancement Division, which is responsible for statewide waste reduction activities, has 20 FTEs. Figure 5 shows the three offices within Environmental Enhancement with responsibilities related to waste reduction, the waste reduction

Figure 5: Three Offices Within DEQ's Central Office Environmental Enhancement Division Oversee Waste Reduction Programs in Virginia (July 2008)



Note: Coastal Resources (4 FTEs) and Environmental Impact Review (4 FTEs) offices are not shown because they have no waste reduction responsibilities. Dollar amounts are the amounts DEQ spent on each program in FY 2007.

Source: Information provided by DEQ, summer 2008.

programs housed in each office, and the amount of funding provided in 2007 to these programs. Also shown are the number of filled FTE positions as of August 2008. Three of the FTEs in Environmental Enhancement are dedicated solely to waste reduction activities, one in the Pollution Prevention office, one in Waste Tire Management, and one in Environmental Education.

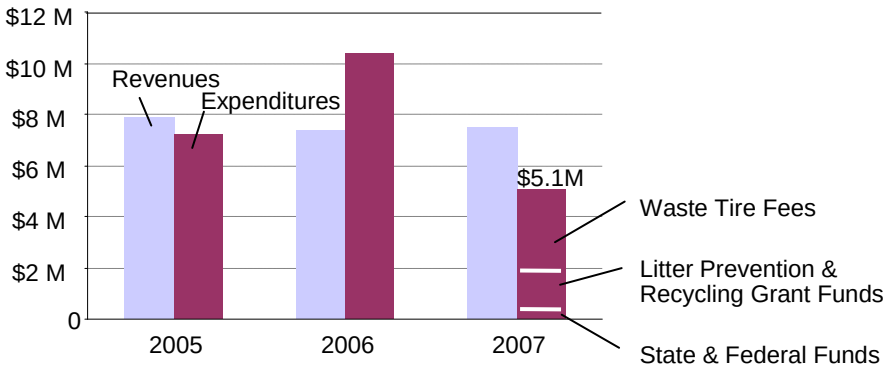
DEQ is required by the *Code of Virginia* to operate a pollution prevention program and three recycling programs that target specific materials. As shown in Figure 5, two of the material-specific recycling programs—Used Motor Oil, Oil Filters, and Auto Fluids Management and Used Lead Acid Battery Management—do not receive specific appropriations. The Pollution Prevention office administers programs that seek to prevent the production of pollution by businesses and industrial facilities. These programs ad-

dress waste reduction, hazardous waste management, and air and water pollution. Funding for the pollution prevention programs comes from State general funds and federal grants.

Two waste reduction programs have dedicated, non-reverting funds that can only be used for their specified purposes. The Waste Tire Management program draws its revenues from the $1.00 fee assessed on tires sold in Virginia and has its own office and one FTE within Environmental Enhancement. The Litter Prevention and Recycling Grant program draws its revenues from three taxes. An FTE within the Environmental Education office administers this program.

DEQ spent approximately $5.1 million on the Pollution Prevention, Waste Tire Management, and Litter Prevention and Recycling Grant programs in FY 2007 (Figure 6). This amount represents a decrease in expenditures from the two previous fiscal years. Since the majority of revenues and expenditures are for the Waste Tire Management and Litter Prevention and Recycling grant programs, which use dedicated, non-reverting accounts, revenues and expenditures seldom match each year. In most cases, this is because money in the Waste Tire Trust Fund is carried over from year to year until funds are sufficient to bid a contract for a tire pile clean-up project.

Figure 6: DEQ Funding for Waste Reduction Activities (FYs 2005-2007)



Note: Expenditures in 2006 were greater than revenues because DEQ carries over Waste Tire Management monies until enough is available to contract for tire pile clean-up services.

Source: Data provided by DEQ, summer 2008.

LOCAL GOVERNMENT ROLE IN WASTE MANAGEMENT

In Virginia, primary responsibility for solid waste management, including recycling and other waste reduction efforts, lies with localities. Local programs may differ widely in terms of the services provided and the use of the public or private sectors to provide them. Some localities operate public landfills or host private landfills and derive substantial revenue from these facilities. However, localities also may have limited control over the solid waste generated or managed in their jurisdictions, potentially complicating efforts to divert waste from landfills.

Local Solid Waste Management Efforts Vary Throughout the State

Solid waste management has traditionally been a local government function in Virginia and throughout the United States, but the extent of a locality's involvement in managing its solid waste varies considerably. State statutes and regulations give localities broad authority to design waste reduction programs and manage the collection and disposal of solid waste. Sections 15.2-927–939 of the *Code of Virginia* enable localities to perform a variety of basic functions, including

- directly operating solid waste management facilities and providing solid waste and recycling services;
- contracting with another locality, an agency of the State, or a private company to provide these services;
- regulating private waste collectors and haulers through licensing requirements, the delineation of service areas, and rate regulations; and
- regulating the siting of solid waste facilities within their jurisdiction.

In addition, provisions in the *Code of Virginia* also allow local governments to manage their solid waste individually or with neighboring localities through regional bodies or solid waste planning units.

Waste management systems vary widely throughout the State. Solid waste programs may include the direct provision of services, contracts with private providers, or loose regulation of the free market. The processing and disposal infrastructure, including facilities and equipment, may be owned and operated privately, publicly, or through joint partnerships. Collection of trash and recycling materials may be curbside for single-family homes in many urban and some suburban parts of the State, while manned or unmanned collection sites are more common in rural localities and

some suburban areas. Commercial entities and multi-family dwellings throughout the State generally rely on private operators for waste and recycling services. Waste reduction programs also vary. Localities focus on different recycled materials depending on available resources, material processing costs, and access to markets. Some programs may also use waste-to-energy, incineration, or composting to divert additional waste from landfills.

Local Governments May Derive Income From Landfills and Other Waste Management Facilities

Publicly owned and operated landfills can generate important revenue for localities. Localities may have financial interests in solid waste landfills, potentially providing a disincentive to recycling rates greater than the minimum required by the State. Although increased operating costs and stronger regulations have led many localities to close their landfills, data from DEQ indicates that 50 of the 60 active sanitary landfills in Virginia are publicly owned and operated. If significant capacity remains, some localities may have an incentive to offset construction and operating costs by accepting adequate amounts of waste. For example, Page County received approval from DEQ to increase the daily limit at its Battle Creek landfill from 250 to 350 tons—an amount county officials believe will generate enough revenue to fully fund the county's solid waste and recycling program. The county is now seeking to contract with neighboring localities to accept additional waste.

Several local governments also rely on revenue from private landfills operating in their jurisdiction to pay for basic services or fund their solid waste and recycling programs. The VWMA requires private landfill operators to provide "financial compensation" (host fees) to their host locality, and in the past this has included a percentage of revenue from tipping fees, free disposal and recycling services, guaranteed capacity at the landfill, and funding to close old landfills. Such arrangements can provide localities with substantial revenue, which may then be used to fund construction of new schools and other needed infrastructure. For example, King & Queen County approved construction of a private landfill in 1990. At the time, there was widespread public opposition to its construction with concerns raised by county residents over potential problems with odor, truck traffic, and environmental hazards. The county has received financial benefits from hosting the landfill, however. The landfill operator reported to DEQ that it accepted about 1.1 million tons of waste in both 2006 and 2007 (about 70 percent of which was from out of state) and that it paid the county host fees of about $3.9 million in both years.

Localities may also benefit financially from allowing privately owned transfer stations and materials recovery facilities (MRFs) to locate within their jurisdiction. A case in point is the Manassas transfer station. The City of Manassas and Waste Management, Inc., negotiated the opening of a transfer station in 1996 after the Prince William County landfill raised its fee for accepting the city's trash. The transfer station reduces the waste hauling costs of the company. Waste Management pays the city a host fee based on the amount of out-of-city waste it accepts. In FY 2004, 80 percent of the trash accepted at the transfer station was from outside the city.

Local Governments Do Not Control All the Solid Waste Produced or Accepted in Their Jurisdictions

Although localities are responsible for managing their solid waste and complying with State recycling mandates, the collection and disposal of a substantial portion of the waste stream may be outside their control. Much of the collection, processing, and disposal of waste is handled by private operators who may be subject to only limited regulations. As noted in Chapter 1, private facilities in Virginia accept the majority of out-of-state trash. Commercial waste, which comprises between 35 and 45 percent of the total municipal waste stream, is largely handled by private operators. These waste streams may not be subject to recycling and other waste diversion programs developed by localities or regional bodies.

Legal restrictions appear to hamper efforts by localities to assert greater control over waste handled by private operators. "Flow-control" ordinances allow localities to direct trash to publicly owned facilities. Although the *Code of Virginia* grants localities flow-control authority, ordinances have been subject to repeated legal challenges and may be legal only in limited circumstances. Without these ordinances, trash not collected by the locality–either directly or through subcontracts–is likely to bypass public facilities such as recycling centers and waste-to-energy centers when tipping fees at private landfills or processing centers are less expensive. Local control may also be limited by provisions in the *Code of Virginia* restricting how localities and regional bodies can take over operations from private operators.

A 2007 ruling by the U.S. Supreme Court could also increase the authority of planning units to enforce planning and recycling priorities on all waste generated within their jurisdictions, including waste collected by private haulers. In *United Haulers Association Inc. v. Oneida-Herkimer Solid Waste Management Authority*, the Court ruled that local governments may direct the flow of solid waste to publicly-owned and publicly-operated waste management

facilities without violating the U.S. Commerce Clause. While the lower courts are still considering how this will be interpreted, the ruling has the potential to give local governments greater authority to achieve solid waste management goals, which may include more recycling. The ruling permits local governments to use monopoly powers to redirect a substantial portion of the waste being generated in Virginia away from private facilities to public ones. At the same time, the capacity of publicly-owned landfills in the State is shrinking compared to that of privately-owned facilities. As a result, the capacity to handle any large-scale shifts may be an issue. Since Virginia is a Dillon Rule state, the General Assembly would have to permit localities to take such action.

Chapter 3

Landfill and Recycling Costs for Localities and the Availability of Recycling Markets

In Summary

An advantage of waste reduction activity for many localities is that it can prolong the life of the existing landfill. On the other hand, in many parts of Virginia a locality's cost per ton of recycling municipal solid waste appears to be higher than the cost per ton of landfill disposal. Recycling costs may compare more favorably to landfilling costs in urban areas where tipping fees are high and recycling programs can generate a greater volume of materials. Revenue from the sale of recyclables and avoided landfill fees can also make recycling more cost-effective. Problems finding end users, or markets, for some recycled waste products can limit the success of local recycling efforts. Markets for paper and metals appear stronger at this time in Virginia compared to other commonly collected materials. Markets are generally more limited in rural localities where distances to end users can be substantial and recycling programs may generate inadequate volumes of materials to interest end users.

Recycling of municipal solid waste (MSW) is the primary waste reduction activity in Virginia. The success of recycling depends upon having processors who can transform waste into usable products and end users who are willing to buy and use recycled products. A strong market for a recycled product is one in which there is a high level of known demand for the product at a price that covers collection and processing costs. Materials that are costly to collect or process may have limited demand at such a price because virgin materials may be less expensive. End users that constitute the market for a particular recycled product may be companies or other private sector organizations large and small, government agencies, or consumers.

Access to viable recycling markets can influence both the cost and effectiveness of local recycling programs. Because localities and regional bodies largely fund their own recycling efforts, disposal and recycling costs act as incentives that may favor landfill disposal, recycling, or incineration under differing circumstances. Recycling costs also influence the access to recycling markets because recyclable materials are commodities that compete with virgin materials in the manufacturing of new products. Conversely, strong markets help make recycling more cost-effective by providing localities and authorities with revenue from the sale of materials, attracting private solid waste operators into public-private partnerships, and ensuring that recyclable materials are not landfilled.

LOCALITY COSTS FOR WASTE DISPOSAL VERSUS RECYCLING AFFECT THE SCOPE OF LOCAL RECYCLING PROGRAMS

One of the advantages of waste reduction activities for many localities is that these activities can extend the life of the existing landfill capacity. This not only helps the localities maximize their use of the existing space, but also helps them minimize the extent to which, over time, there is a need to address issues such as the closure of landfills, the siting of new landfills and the controversy that this can entail, and planning and construction costs for new landfills.

However, recycling programs have a cost; and in terms of annual operating costs, the cost to the locality for a ton of waste that is recycled can exceed the cost per ton of waste that is disposed in the landfill. The cost of recycling programs is an important concern for many localities and regional bodies. JLARC staff surveyed 153 SWPUs and member localities and received responses from 96 (63 percent). Over two-thirds of localities responding to the JLARC staff survey indicated that the cost of collecting and processing recyclables is a challenge. This section discusses the SWPUs' recycling and landfill disposal costs only, and does not attempt to quantify any broader societal or environmental costs or benefits that might be associated with such activities. Curbside and drop-off programs can be costly and generally require financial support from government to operate. As will be discussed in Chapter 8, localities provide the bulk of public funding for recycling in Virginia, and in the case of localities, funding for solid waste management competes with other funding needs such as public safety and education.

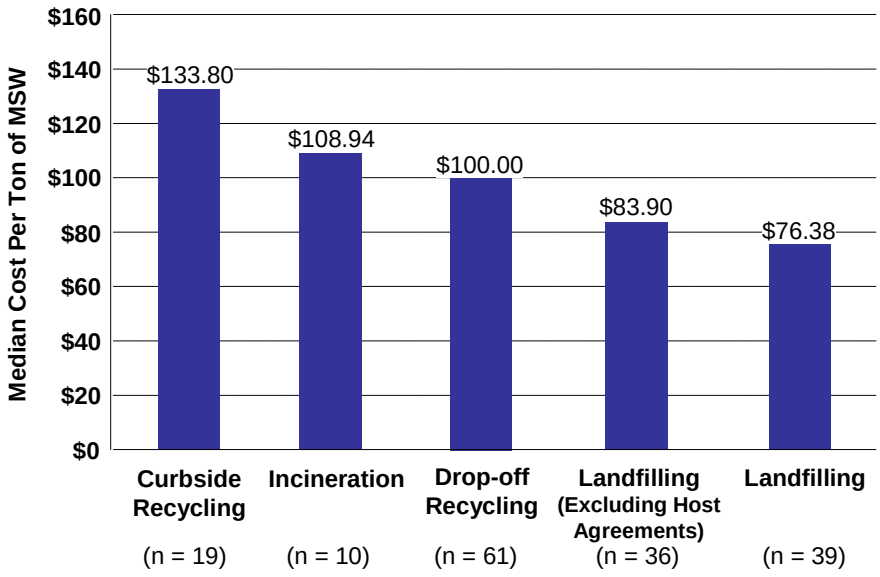
Consequently, the costs of recycling and landfilling can influence the type of recycling program a locality operates as well as its success in diverting solid waste from landfills. Localities may favor landfill disposal if their costs for recycling are relatively high or they have access to inexpensive or free landfills. Localities that lack the resources to support extensive recycling programs may struggle to divert waste from landfills. Similarly, localities that own or operate their own landfills may lose substantial revenue by diverting waste through recycling programs. Conversely, localities may favor recycling when landfilling costs are high or a recycling program is able to achieve economies-of-scale in the collection, processing, and sale of recyclable materials.

Cost Per Ton for Recycling Can Be More Expensive for Localities Than Cost Per Ton for Landfill Disposal

Although waste recycling and disposal costs can be difficult to estimate, there are indications that recycling is generally more costly

for localities (and regional bodies) than landfill disposal. Three-quarters of the localities and regional bodies providing cost estimates through the JLARC staff survey of local recycling programs indicated that the cost of their recycling programs exceeded their MSW landfilling costs. As Figure 7 shows, survey responses indicated that the median cost of landfilling one ton of MSW in Virginia is lower than the median cost of recycling through curbside or drop-off programs. Landfill disposal also appears to be less expensive than incineration. (Reported costs reflect current costs incurred by localities. Some analysts believe recycling costs are becoming more competitive with other forms of waste management.) Finally, the median landfill disposal cost falls to $76.38 when the analysis includes localities that receive free landfill disposal through a host agreement with a privately operated landfill. (Host agreements specify the contractual relationship between a private landfill operator and the host locality, and are discussed in greater detail below.)

Figure 7: Reported Locality Costs of Curbside and Drop-Off Recycling Generally Exceed the Cost of Landfilling (2007)



Note: Landfill and recycling cost estimates reported include labor; equipment and infrastructure; administrative overhead; tipping fees paid at landfills, transfer stations, and material recovery facilities; collection and hauling; and the cost of contracts with private operators for services.

Source: JLARC staff survey of local recycling programs, summer 2008.

Published reports have also found the cost of recycling to exceed the cost of landfill disposal. Academic studies published in the 1990s found the cost of recycling to be higher than the cost of landfilling, and similar findings have been reported in this decade. A 2001 review of recycling programs in Wisconsin prepared by the

State Legislative Audit Bureau concluded that landfill disposal averaged $85 per ton while residential recycling averaged $95 per ton. A 2002 review of municipal recycling in Minnesota noted that some of the state's counties were struggling to divert waste from landfills because private solid waste haulers favored landfill disposal as the least expensive disposal method. JLARC staff heard similar concerns from Virginia localities regarding MSW collected by private haulers.

Although JLARC staff survey data suggest that recycling and incineration are more costly than landfilling, cost estimates provided by localities and regional bodies varied widely and likely depend on many factors. For example, while the median reported cost of curbside programs was $133.80 per ton, curbside costs were as low as $55 per ton for one Northern Virginia locality and several localities reported costs substantially higher than $133. Cost estimates for drop-off recycling and landfilling varied over a similarly wide range. Previous studies of recycling costs conducted by the EPA, another state audit bureau, and a regional recycling council also reported widely varying cost estimates.

The following case study illustrates how curbside and drop-off recycling is more expensive than landfilling for one locality that is a member of a regional solid waste authority.

Case Study

One suburban locality has a population density of more than 1,000 persons per square mile. The locality is a member of a regional solid waste authority and pays a per-household fee to the authority to receive curbside recycling services, including collection, processing, marketing, and administrative services. Locality staff estimated that in FY 2007, the cost for these services was $130 per ton of material collected in the locality. In addition to curbside recycling services provided by the authority, the locality maintains 14 drop-off collection sites. The collection and processing of recyclables from these sites is done by private contractors. The locality estimated the cost of its drop-off recycling program to be $80 per ton of material collected. The locality also owns and operates a landfill and estimated the annual cost of operating the landfill to be approximately $25 per ton of MSW buried. The locality charges private solid waste haulers a tipping fee of $50 per ton of solid waste delivered. However, landfill costs and fees may not reflect all long-term capital costs because these figures are difficult to estimate.

Additional Cost of Collection and Processing May Account for the High Cost of Recycling Reported by SWPUs. The comparatively high cost of recycling reported by some localities and regional bod-

ies likely reflects the additional collection and processing steps involved in recycling. Unlike material bound for a landfill, recyclables generally must be sorted and bundled before being shipped to end users. For example, materials collected in a single stream must be sorted, and contaminants must be removed to ensure that the material collected is of a high quality. Recycling costs may also be higher because some recyclables cannot be hauled as compactly as solid waste going to a landfill. For example, commingled recyclables may contain glass which, if crushed, can contaminate materials such as plastics or paper. Additionally, such reported costs do not include estimates of revenue received from the sale of recyclables or potential societal benefits from recycling, such as less energy usage.

Recycling programs often require a separate infrastructure to handle the collection and processing of materials. In some cases, the capital costs of developing this infrastructure can be substantial. Additional staff and vehicles may be needed for communities that operate extensive curbside or drop-off programs. Where large volumes of material are collected for recycling, a materials recovery facility may be needed. Other capital costs may include providing collection bins for residents served through a curbside program or roll-off containers for a network of drop-off sites. Finally, administrative staff may be needed to oversee a recycling program, particularly if services such as the collection or processing of materials are provided through contracts with private operators.

Localities Classified by Population Density

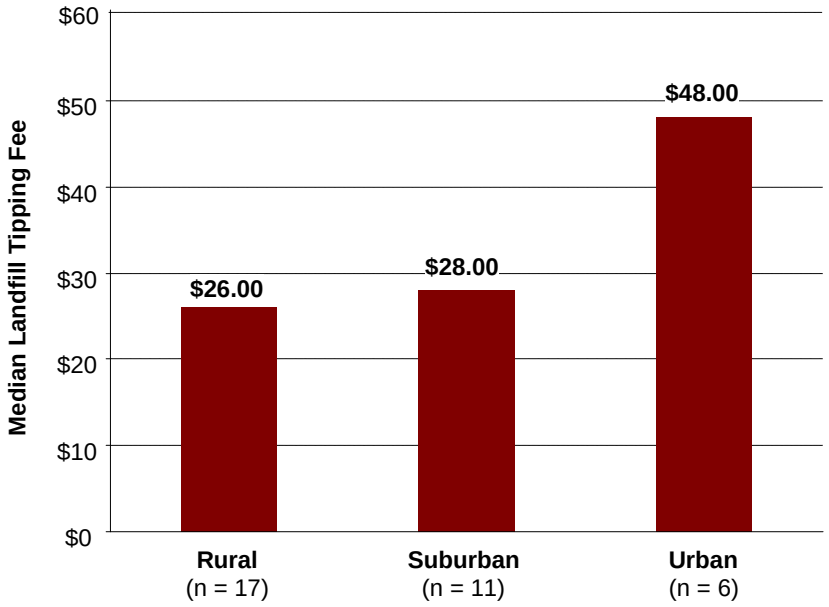
JLARC staff classified localities by population density as shown below, using a definition of urban similar to that of the U.S. Census Bureau. The rural designation qualifies localities for the 15 percent recycling rate under the *Code of Virginia*.

Classification	Persons per Square Mile
Urban	1,000 or more
Suburban	100 or more but less than 1,000
Rural	Less than 100

Landfilling May Be Substantially Less Expensive Than Recycling for Some Rural Localities. There are indications that landfill tipping fees—an important component of the overall cost of landfilling—are substantially lower in rural parts of Virginia. According to data from the JLARC staff survey of local recycling programs, the median landfill tipping fee is approximately $22 lower for rural localities compared to urban localities (Figure 8). These results are consistent with national and regional surveys of landfill tipping fees, which suggest that fees are generally higher in more densely populated areas. Nationally, tipping fees have been highest in the northeast and mid-Atlantic regions and lowest in the west-central and south-central parts of the country.

Localities May Receive Additional Benefits From Siting Certain Landfills. Landfill disposal may be a particularly cost-effective alternative to recycling for localities that have permitted the siting of a private landfill in their jurisdiction. The *Code of Virginia* (§10.1-1408.1) requires localities and landfill operators to reach a "host agreement" that includes, among other provisions, the amount of financial compensation to be provided to the locality. A limited number of localities have permitted the siting of a private landfill in their jurisdiction. Results from the JLARC staff survey

Figure 8: Reported Landfill Tipping Fees Are Higher in More Densely Populated Localities (2007)



Note: The 17 rural localities include one regional SWPU. The 11 suburban localities include two regional SWPUs.

Source: JLARC staff survey of local recycling programs, summer 2008. Population data are for 2007 and are from the Weldon Cooper Center for Public Service and the U.S. Census Bureau.

of local recycling programs indicate that 16 localities—or approximately 21 percent of respondents—maintain a host agreement with a private landfill operator. In all but one case, the locality indicated receiving free or reduced-price landfill services, and 11 localities indicated receiving cash payments in exchange for permitting a new landfill. A smaller number of localities indicated receiving assistance with the cleanup and maintenance of inactive landfills.

While most host agreements appear to provide incentives to landfill MSW, others may also favor waste diversion by requiring landfill operators to assist localities with their recycling programs. Three localities responding to the JLARC staff survey indicated receiving assistance with their drop-off program. The following case study illustrates how one county receives a variety of benefits, including free landfill and recycling services, from a private landfill operator.

Case Study

In the early 1990s, King George County granted a private solid waste firm the exclusive right to operate a landfill in the county. In return, the county receives free disposal of its

solid waste as well as a fixed fee per ton of solid waste landfilled. These fees have totaled approximately $6.2 million annually in recent years and can be used only to pay the construction debt service on schools and other public buildings. In recent years, the county has built elementary and senior high schools, a fire station, and will begin construction on a new government center in the future. The landfill operator also agreed to assist the county with the cleanup and ongoing monitoring of its old landfill and to operate up to three drop-off sites for the collection of recyclables. However, the county's reported recycling rate in 2007 was among the lowest in the State, at 10.8 percent.

There is widespread recognition that low landfill costs can limit the success of recycling programs. Localities appear to recognize the influence of landfill costs. One locality responding to the JLARC staff survey indicated having "difficulty justifying recycling when it costs more per ton than landfilling the material." A locality receiving free solid waste disposal through the landfill it hosts said it sees "no incentive to recycle because waste disposal is free." Similarly, a recycling advocate told JLARC staff that low landfill costs can be an obstacle to achieving higher recycling rates.

Locality Costs for Recycling Compares More Favorably to Landfill Disposal Costs Under Some Circumstances

While recycling is generally more expensive than landfill disposal, the costs of recycling and landfilling may be more comparable under some circumstances. Recycling may be a more cost-effective alternative to other disposal methods in urban areas where the cost of landfilling is generally higher, or when localities earn substantial revenue or avoid landfill disposal costs through their recycling programs.

Recycling and Landfill Disposal Costs May Be More Comparable in Urban Parts of Virginia. There are indications that recycling and landfilling costs can be more comparable in densely populated areas of the State such as Northern Virginia. As discussed above, landfill tipping fees appear to be higher in more urban parts of Virginia, possibly reflecting higher land prices or an increased difficulty siting landfills near residential developments. Under these circumstances, localities may find recycling to be a more cost-effective disposal method than landfilling.

The per-ton costs of recycling and landfilling also may be more comparable in urban areas where curbside collection programs are extensive and large volumes of material are collected. An academic review of solid waste programs published in 1999 noted that the average per-ton cost of recycling falls with increasing amounts of

recyclables. Achieving such economies-of-scale requires generating large volumes of recyclable materials, and that appears to be most feasible in urban areas where curbside collection is provided and residential development is relatively dense. By contrast, as the Federal Reserve Bank of Minneapolis noted in a 2005 review of recycling, these economies-of-scale can make recycling a "difficult proposition" in less densely populated areas.

Recycling Revenue and Avoided Landfill Disposal Costs Can Make Recycling More Cost-Effective. Recycling can also be more cost-effective when revenue is earned from the sale of materials or landfill costs are avoided. More than one-third of localities responding to the JLARC staff survey of local recycling programs indicated revenue from the sale of recyclables is used to fund their recycling efforts. Similarly, diverting waste from landfills can represent a cost savings by minimizing landfill disposal and hauling fees, and can also extend the life of a landfill. However, interviews with localities and data from the JLARC staff survey suggest that recycling revenue and landfill cost savings usually do not offset all the costs of recycling programs.

Revenue from the sale of recyclables appears to be a limited and volatile source of funding for many localities and regional bodies. A majority of localities and regional bodies responding to the JLARC staff survey of local recycling programs indicated selling their recyclables for revenue. (As previously discussed, a smaller percentage of localities indicated funding their recycling programs in part through recycling revenue. Some localities may direct such revenue to their general fund or overall waste management budget.) However, the revenue from the sale of recyclables averaged 24 percent of total recycling expenditures. The difficulty of fully funding recycling programs through the sale of material has been noted in the solid waste literature and in a report by the State. In developing recycling program guidelines for State agencies in 1991, the Department of Waste Management stated that "very few recycling collection programs generate enough revenue from the sale of collected recyclables to meet all the costs of the program." Recycling revenue can also fluctuate widely with the markets for recycled and virgin commodities as well as the larger economy. For example, one Northern Virginia locality told JLARC staff that recycling revenue in FY 2007 was approximately $587,000 and increased to more than a million dollars in FY 2008 as markets for recyclables improved.

Recycling revenue can also depend on whether programs use public-private partnerships to provide recycling services. Some localities are able to avoid costs for certain materials by negotiating with private operators to provide collection, processing, and transport services in exchange for some or all of the revenue. Five locali-

ties responding to the JLARC staff survey indicated that all revenue from the sale of recyclables was kept by private contractors responsible for collecting, processing, or selling material.

Importantly, not all localities will avoid substantial landfill costs by recycling solid waste. Landfill cost savings will be limited when free or reduced-price landfilling is available through host agreements with private landfill operators or when the landfilling of MSW is primarily handled by the private sector. The following case study illustrates how recycling revenue and avoided landfill costs defrayed some but not all recycling costs for one locality in 2007.

Case Study

Caroline County spent approximately $110,000 in FY 2007 for contracts with recycling haulers and processors. Additional recycling expenditures included labor, administrative oversight, and the cost of hauling materials, but county staff were not able to estimate these expenditures. Staff reported receiving roughly $37,000 in recycling revenue, mainly through the sale of scrap metal. The county also reported collecting 3,365 tons of recyclables in 2007, primarily through its drop-off collection program, and paid a tipping fee of $30 per ton to landfill its MSW. At that tipping fee, recycling saved the county approximately $101,000 in avoided landfill costs in 2007. At $138,000, recycling revenue and avoided landfill fees more than offset the cost of recycling contracts, but county staff do not believe they cover the full cost of recycling when labor, administrative oversight, and hauling costs are included.

LIMITED ACCESS TO MARKETS CAN LIMIT THE EFFECTIVENESS OF LOCAL RECYCLING PROGRAMS

The availability of markets for recyclable materials is widely recognized as a primary factor influencing the effectiveness of recycling programs. A review of successful recycling programs published by the EPA in 1999 concluded that a program "can only be as successful as [its] recycling market program." Without recycling processors or end users to purchase recyclables or take them at no cost to the locality, localities and regional bodies may have to landfill material collected for recycling. As a result, materials that lack strong markets may not be collected through local recycling programs.

Recycling markets are made up of several types of potential buyers of recyclable materials. One type of buyer includes manufacturers that use recyclable materials in their production processes. For example, a foundry may purchase scrap metal salvaged from old ap-

pliances for use in the production of new metal. A second type of buyer includes processors that prepare recyclable materials for later use in a production process. For example, deinking plants remove the ink from newspapers and mixed paper, producing a pulp that can be used to make new paper. A third type of buyer for recyclable materials includes brokers that purchase materials for resale to manufacturers. Finally, a fourth type of buyer includes reuse or remanufacturing firms that prepare a material directly for reuse. These buyers include tire retreaders and pallet rebuilders.

Localities and Authorities Market Their Recyclables Directly or Through Private Contractors

Local recycling programs sell their recyclable materials to buyers under differing arrangements. Some localities and regional bodies rely on private contractors to find buyers for materials collected. In these cases, the sale of materials is often part of a larger contractual agreement with the contractor. For example, the Central Virginia Waste Management Authority, which administers a contract for recycling services for 13 localities in the Central Virginia region, contracts with an established recycling processor to collect, process, and sell its recyclables. The contractor assumes full responsibility for marketing the materials and keeps most of the revenue from their sale.

Other SWPUs manage the sale of their recyclable materials directly, particularly when smaller volumes of material are generated. Staff with the locality or regional authority identify potential buyers and negotiate contracts for the sale of materials. Recyclables may be transported by program staff, or by the buyer with transport and fuel costs included in the purchase price. For example, solid waste staff with Appomattox County research markets and identify buyers for materials collected through the county recycling program.

Access to Recycling Markets in Virginia Varies Based on the Type of Material and Other Factors

According to recycling advocates and local program staff, markets for many recyclable materials have been relatively strong in recent years. Nonetheless, finding markets for recyclables is a common concern throughout Virginia. Forty percent of localities and regional bodies responding to the JLARC staff survey of local recycling programs indicated that access to markets is a challenge. In addition, JLARC staff frequently heard concerns regarding markets during interviews with local recycling program staff and recycling advocates.

The market for a recyclable material can depend on three important factors. First, the volume of material can influence the number of potential buyers as well as the purchase price of a material. It is often more cost-effective for recycling processors and end users to purchase and ship larger quantities of a material. As discussed below, limited volume appears to be one reason why recycling programs in rural areas struggle to find markets.

A second factor influencing the availability of markets is the quality of the material collected. Most recyclables must be free of impurities to be used as raw material in a production process. Recycled materials with a high degree of contamination may command a lower price on the market or be rejected by buyers. The material then may be landfilled. For example, when plastics or paper are collected in a commingled stream with glass containers, the plastic or paper can become contaminated with glass shards, requiring that the entire load be landfilled.

Finally, the availability of markets for recyclable materials is heavily influenced by commodities prices. When the price of a virgin material is high, demand for a substitute recycled material may increase and local recycling programs may find more buyers for their material. Conversely, a low price for a virgin raw material can make it difficult to sell the recycled substitute at a price that covers the cost of collecting and processing the recycled material. For example, limited markets for recycled glass in part reflect the low price of sand, the main ingredient in glass.

Availability of Markets Makes Some Materials More Cost-Effective to Recycle Than Others. Materials with consistently strong markets are often more cost-effective to recycle than materials with volatile or consistently weak markets. For example, market prices for some papers and metals may fully offset collection and processing costs, and may even provide a locality or regional authority with substantial revenue. By contrast, glass and some plastics appear substantially less cost-effective due to weaker demand, lower prices on commodities markets, and higher processing requirements. As a result, localities and authorities may struggle to recoup the cost of recycling these materials through their sale, and end users such as glass and plastics manufacturers may find it more cost-effective to use virgin materials.

Although access to recycling markets varies substantially by region, the market for most papers and metals appears to be strong throughout the State. As shown in Table 3, majorities of localities and regional bodies responding to the JLARC staff survey of local recycling programs rated the markets for copper, aluminum, steel, cardboard, and paper as excellent. Localities and regional bodies also consistently emphasized the strength of these markets during

Table 3: Markets for Commonly Collected Recyclables Vary in Strength

Material	Market Rated Excellent (Percent)	Market Rated Fair (Percent)	Market Rated Poor or Nonexistent (Percent)	Number of Respondents	Material Not Collected (Number)	No Opinion on Market Strength (Number)
Locality Responses						
Copper	83.0%	13.2%	3.8%	63	8	10
Aluminum	77.8	19.0	3.2	63	0	12
Steel	75.0	21.9	3.2	64	1	10
Cardboard	62.5	26.8	10.7	56	1	16
Paper	55.9	37.3	6.8	69	0	17
Plastics 1-2	39.1	37.0	23.9	46	6	18
Yard Waste	34.1	27.3	38.7	44	12	13
Tires	21.8	30.9	47.3	55	2	15
Plastics 3-7	21.4	25.0	53.6	28	24	13
Clear Glass	8.7	17.4	73.9	46	7	17
Colored Glass	8.2	12.2	79.6	49	7	14
Regional Body Responses						
Copper	87.5	12.5	0.0	8	0	0
Aluminum	87.5	12.5	0.0	8	0	1
Steel	77.8	22.2	0.0	9	0	0
Cardboard	57.1	42.9	0.0	7	1	1
Paper	57.1	42.9	0.0	7	1	1
Plastics 1-2	50.0	33.3	16.7	6	1	2
Yard Waste	25.0	50.0	25.0	8	1	0
Tires	0.0	22.2	77.8	9	0	0
Plastics 3-7	0.0	33.3	66.6	3	4	1
Clear Glass	0.0	0.0	100.0	6	1	1
Colored Glass	0.0	0.0	100.0	6	1	1

Note: Paper includes newspapers, magazines, office paper, and mixed paper. Cardboard includes corrugated and noncorrugated. Yard waste includes grass, tree, and shrub trimmings as well as leaves and brush. See Appendix D for description of plastics 1-7.

Source: JLARC staff survey of local recycling programs, summer 2008.

interviews with JLARC staff. By contrast, glass containers and plastics 3-7 appear more difficult for localities and regional bodies to sell. Majorities of both localities and regional bodies responding to the survey—including urban, rural, and suburban localities—rated the markets for clear glass, colored glass, and plastics 3-7 as poor or nonexistent.

Materials such as paper and metal currently benefit from sustained demand and relatively high prices. For example, the contractor processing recyclables for the Central Virginia Waste Management Authority told JLARC staff that demand for cardboard is driven partly by buyers in China, India, and other developing nations. CVWMA was recently able to renegotiate its contracts and secure lower rates for curbside and drop-off recycling, in part because revenue from the sale of paper materials has increased. Global demand also appears to be strong factor behind rising prices for scrap metals. Localities responding to the JLARC staff survey reported receiving as much as $1,600 per ton for aluminum.

More limited markets for glass and plastics 3-7 may reflect higher processing or shipping costs and lower prices for these materials. Plastics differ depending on their resin, and must be identical in chemical composition if blending and recycling are to occur. This requires separating plastics according to their number. Similarly, clear, brown, and green glass have different chemical properties and must be separated prior to recycling. A load of crushed glass—or *cullet*—contaminated with glass of a different color may be rejected by glass manufacturers. Higher shipping costs present another barrier to recycling these materials; glass is heavier than other recyclable materials, while plastics are difficult to compact. As a result, localities and regional bodies may lose money recycling these materials. One regional recycling body told JLARC staff it loses approximately $6,000 per year by recycling glass containers.

The solid waste literature has also found that some materials are more cost-effective to recycle than others. One review of the economics of recycling noted that the economic and environmental benefits of recycling depend on the material, with most metals performing better than plastics. Similarly, a review of recycling by the Minneapolis Federal Reserve concluded that

> [recycling] programs may be wiser to focus on increased collection of some materials—aluminum and paper, for instance—but drop others, like some types of plastic (and maybe even plastic bags) that are expensive to collect and process, and have little market value.

Rural Localities May Have Greater Difficulty Finding Markets for Recyclable Materials. Although markets for paper and metals appear to be particularly strong, even these materials may be difficult to market for localities and authorities in sparsely populated parts of the State. Access to markets appears to be a greater challenge for rural localities compared to their more urban counterparts. Nearly 60 percent of rural localities responding to the JLARC staff survey of local recycling programs identified access to markets as a challenge to operating their recycling program, while only 32 percent of urban localities identified this as a challenge. In addition, the Virginia Recycling Markets Development Council (VRMDC), an advisory council charged with improving markets in Virginia for recyclables, cited limited access to markets in rural areas as a reason for recommending a two-tiered recycling rate mandate for the State.

Finding markets for recyclable materials can be especially difficult for rural communities because the volume of recyclables collected is often too low to interest buyers. Rural localities may collect low volumes of materials because the population is small and dispersed, and because drop-off sites are used, which are generally

regarded as less convenient than curbside collection. A second factor limiting the availability of markets for rural localities is that sparsely populated areas are often great distances from potential buyers. This can substantially increase transport and fuel costs, limiting the value of the material collected and the number of buyers willing to purchase it.

Low volumes of material and increased distances to markets are frequently cited to account for the lack of markets in rural parts of Virginia. According to DEQ staff, even with an excellent recycling program, areas with low population will still struggle to collect recyclables in quantities that attract buyers. DEQ staff cited small volumes of material to explain why recycling purchasers say some recyclable materials are in short supply but choose not to purchase materials from rural localities. In fact, in 2005 the director of a regional authority operating in Southwest Virginia recounted for the VRMDC how one potential buyer of recycled paper assessed the region and concluded that the hauling distance would be great and the volume of material too small to make the purchase cost-effective. In addition, the Southern Crater Region SWPU, which includes the counties of Dinwiddie and Greenville, the City of Emporia, and other localities, explained in 2005:

> Marketing is [a] challenge for our region. Currently there is no recycling market in the Southern Crater Region and we do not collect a large enough volume of any one recyclable to ensure a guaranteed market. All collected materials have to be delivered outside of our region to Richmond or the Hampton Roads area. This becomes a very expensive activity for small localities.

Chapter 4

State Policies, Planning, and Resources for Waste Reduction

In Summary

An assessment of the Commonwealth's role in waste reduction reveals some areas of strength and weakness. The State has in place a statutory framework which has long provided for solid waste planning units and required local plans as well as the reporting and use of recycling data. The statute sets minimum recycling rates using two tiers which recognize population density differences, and requires DEQ to monitor these rates. The State also has a waste reduction policy in the form of the waste management hierarchy. However, no single document is available as a comprehensive statewide plan, and there are no measurable goals for the future (beyond maintaining current recycling rates). Also, the State has currently dedicated few resources to waste reduction activities at the State level or to assisting local-level waste reduction efforts.

Senate Joint Resolution 361 identifies a set of concerns about Virginia's approach to handling its solid waste. Concerns include the availability of future landfill space and State funding and long-term planning for waste reduction. After substantial increases in the amount of waste Virginia's permitted waste management facilities received since 1998, data suggest that these amounts are tapering off slightly. However, it is difficult to tell if this trend is the result of State efforts at waste reduction or other factors.

STATE HAS A USEFUL STATUTORY FRAMEWORK IN PLACE FOR PROMOTING WASTE REDUCTION

The *Code of Virginia* establishes the State's solid waste management framework. The framework consists of several important elements, including the waste management hierarchy discussed in Chapter 2, solid waste management planning by localities, and recycling rate mandates. The hierarchy is intended to serve as the Commonwealth's waste reduction policy and identifies several options as more favored than waste incineration or disposal, including planning, source reduction, reuse, reclamation, and resource recovery. Local planning is to establish how the hierarchy will be implemented.

Since 1989, statutory language has authorized State regulations with specific requirements for local and regional solid waste management plans. The language required minimum recycling rates of ten percent by 1991, 15 percent by 1993, and 25 percent by 1995. The 25 percent requirement was in place for all solid waste planning units (SWPUs) until 2006, when the requirement was re-

duced to 15 percent for planning units with lower population densities or higher unemployment rates. JLARC staff analysis of recycling data for this study indicates that population density is a factor associated with recycling rates and that recycling rates of about 15 to 25 percent are about what might be expected of Virginia localities at currently typical statewide performance levels (see Appendix G). The majority of Virginians live in localities where the SWPU is responsible for a 25 percent rate.

At the time that State law first required a 25 percent minimum for all SWPUs, the national recycling goal set by the U.S. Environmental Protection Agency (EPA) was 25 percent. In 1996, that national recycling goal was revised to 35 percent. Although the mandated minimum rate for SWPUs has not increased, local efforts going beyond the minimum have meant that Virginia has reported recycling rates at around the level of the national goal.

STATE LACKS A SINGLE, COMPREHENSIVE, STATEWIDE PLAN AND MEASURABLE GOALS FOR FURTHER PROGRESS

Senate Joint Resolution 361 expresses concern that the State has not addressed reducing waste disposal through a long-term plan. Partly as a consequence, the State lacks a set of goals for making further progress in the longer term. Some additional State direction for the future appears appropriate.

State-Level Planning Could Be Improved

In response to federal requirements enacted in 1976, Virginia submitted a State solid waste management plan to EPA in 1979. However, funding for EPA's review program was eliminated before Virginia's plan was evaluated, and the plan never received formal approval from EPA. Virginia has not updated this plan or developed a new plan since.

Instead of revisiting the plan, DEQ developed a document in 2004 that provides an overview of the statutory, regulatory, and guidance documents currently used to coordinate Virginia's solid waste planning efforts. However, this document, *Elements of Solid Waste*, does not approximate the same level of thoroughness and rigor found in the State's 1979 plan. According to DEQ staff, the department determined a more streamlined and practical version would be more useful to the public. The 2004 document contains descriptive and explanatory elements of the current solid waste program, stating that the "existing solid waste management structure is governed by a series of laws, regulations, and guidance, augmented by a series of reports." The document also contains a description of Virginia's solid waste management planning efforts, which highlights that the Commonwealth "does not rely on a single

unified document as a 'State Solid Waste Plan.'" Rather, the solid waste management program is "directed and coordinated in accordance with a suite of legal requirements and official documents under a blend of state, regional, and local planning authorities and responsibilities."

Table 4 identifies many of the programs and policies identified by the *Elements of Solid Waste* that serve as the State's solid waste planning framework. While other initiatives are in place, the framework primarily addresses diverting materials from landfills through enforcement of mandatory recycling rates at the local level, and to a lesser extent through assistance to entities voluntarily wishing to reduce their production of waste.

As the table indicates, most of the laws enacted concerning waste reduction address some aspect of recycling, such as local mandatory recycling rates, tax credits for recycling equipment, or grant funding to assist localities with developing recycling programs. State attempts at promoting waste reduction in State agencies and universities have also focused primarily on recycling, such as cre-

Table 4: Virginia's Waste Reduction Policies and Programs Emphasize Recycling

Policies and Programs	Description
Waste management hierarchy	Prioritizes waste management practices with source reduction being the highest priority, followed by reuse, recycling, incineration, and landfilling.
Pollution prevention policy	Encourages activities designed to reduce the amount of waste being produced through incentives and assistance.
Solid waste management planning	Requires all solid waste planning units (SWPUs) to submit plans to DEQ identifying all aspects of solid waste planning in their jurisdictions.
Mandatory local recycling rates	Under the planning requirement, each SWPU must maintain a minimum annual recycling rate of 25% or 15% based on certain criteria.
State entity recycling requirement	Requires State universities, agencies, and legislative agencies to implement procedures for recycling and to provide recyclable materials to markets.
Recycled content preference in procurement	Requires State agencies to implement purchase programs for recycled goods.
Specific State agency requirements	Requires the Departments of Business Assistance, Education, and Transportation to initiate efforts to promote recycling, the use of recycled materials, and the expansion of recycling industries.
Council to coordinate recycling market activities	Creates a 20-member council to coordinate Virginia's efforts at establishing recycling markets, assisting local and State entities with marketing their recyclables, and identifying potential market barriers.
Tax credits	Enacts several tax credit programs for oil burning machines and pollution prevention equipment for recycling purposes.
Grant programs	Establishes grant funding for localities and non-profits to assist with implementation of their recycling programs.
Waste tire fund	Encourages beneficial reuse of waste tires.

Source: JLARC staff analysis and DEQ website as of August 7, 2008.

ating a statewide agency recycling coordinator, requiring recycling among State entities, and directing the Departments of Business Assistance, Education, and Transportation to promote recycling.

The current framework does not provide any measurable goals, other than the mandatory local recycling rates, to signal the State's intention regarding future management of solid waste in Virginia. In fact, there is little long-term planning at the State level. According to a former member of the Waste Management Board who advocated for the creation of a plan, DEQ maintained that planning was best left to the localities, via their required solid waste management plans. While localities are required to describe in their plans how they will implement source reduction, reuse, and recycling in preference to disposal methods, DEQ does not make recommendations on the basis of their plan reviews on how localities could increase the use of waste reduction methods. In addition, DEQ does not use these plans to establish any goals for source reduction or reuse.

Some Neighboring States Have a Single, Comprehensive Plan

JLARC staff contacted neighboring states regarding their solid waste management planning and found that like Virginia, all require localities to develop solid waste management plans for their jurisdictions. North Carolina and West Virginia, however, also have a single document that serves as a comprehensive statewide solid waste management plan. West Virginia's plan, which is updated biannually, describes all components of solid waste management in the state and presents options for further integrating waste reduction practices into the state's waste management program. North Carolina's plan, first produced in 1991 and updated for the 2003-2013 period, describes recent trends in waste management, accomplishments and challenges of the past ten years, goals for the next ten years, and actions to accomplish the goals. The plan was developed with extensive public input involving surveys, focus groups, open forums, and solicitation of public comments.

FEW STAFF POSITIONS ARE ALLOCATED TO THE WASTE REDUCTION PROGRAM

While Virginia has established a solid waste management framework and certain recycling requirements, few positions are available to implement such actions. Limited resources appear to have prevented DEQ from taking a strong leadership role in waste reduction efforts. Additionally, while the State places much of the responsibility for waste reduction efforts on localities, few re-

sources are available to assist localities either technically or financially.

Few Positions Provided for Waste Reduction Efforts

As discussed in Chapter 2, DEQ has a total of 105 full-time equivalent staff positions (FTEs) devoted to waste management, but only three of these FTEs are dedicated solely to waste reduction. These three FTEs administer the material-specific recycling programs and the grants program described in Chapter 2, compile the annual recycling rate report, review recycling action plans (RAPs) and portions of local solid waste management plans, and provide technical assistance to local waste reduction programs. Another four FTEs within the Office of Pollution Prevention dedicate only a portion of their time to waste reduction efforts.

Reductions in the number of positions have limited the department's ability to provide assistance for certain waste reduction activities. According to DEQ staff, the amount and nature of assistance DEQ provides to localities today is in stark contrast to the program in the early 1990s, when 14 positions were dedicated to waste reduction activities. With these resources, staff visited localities to observe how programs operated and how data was collected, and then provided localities with tailored, specific assistance on how to improve their programs. Additionally, the State operated an educational materials warehouse that would occasionally send localities materials they could use for outreach and educational purposes. However, all such positions were eliminated during the mid-1990s. Three positions eventually were re-allocated although two positions also have other responsibilities, and the third administers the waste tire program. Between 2002 and 2006, the number of positions in the then Division of Pollution Prevention was also substantially reduced from ten to three positions. The eliminated positions assisted entities in identifying ways to reduce their generation of waste, among other activities.

In July 2008, as a result of budget cuts, the Office of Litter Prevention and Recycling was eliminated. The position responsible for litter prevention was transferred to the Office of Environmental Education and the position responsible for recycling was transferred to the Office of Pollution Prevention. DEQ staff indicate that the duties of these positions will remain essentially the same as before the reorganization.

Despite the reported importance of the local solid waste management plans to the State's solid waste management efforts, the department does not allocate a full-time position to review and approval of the plans. According to DEQ staff, the department was only able to allocate part of a previously existing position (with

previously existing duties) to review the plans because no additional resources were provided. DEQ states that it is only able to allocate 25 to 30 percent of an FTE's time for performing such functions. According to DEQ staff, the current situation affects the department's ability to act on the solid waste management plans in a timely manner. In fact, as discussed in Chapter 5, a JLARC staff analysis of solid waste management plans found that some plans have not been approved by DEQ staff in a timely manner.

As will be discussed later in the report, the position of State Agency Recycling Coordinator was created by the 1998 Appropriation Act and organized within the Department of General Services (DGS). However, according to DGS staff, the position is no longer serving as a statewide coordinator, but the position's responsibilities have been reorganized to serve as the department's recycling coordinator. Currently, responsibility for statewide needs is being handled on an ad hoc basis by DGS and DEQ staff.

Certain Other States Have More Positions for Their Waste Reduction Efforts

Several of the states selected for this review have ten or more FTEs dedicated to waste reduction activities. Such positions are responsible for recycling programs, grants, recycling markets, special programs such as waste tires and used oil, outreach and education, and planning, among other activities (Table 5).

Table 5: Selected States With Ten or More FTEs for Waste Reduction

State	Number of FTEs
Kentucky	11
North Carolina	10
South Carolina	16
Tennessee	13

Source: Interviews with state agency staff and reviews of state agency websites.

FUNDING FOR DEVELOPING AND IMPLEMENTING LOCAL WASTE REDUCTION PROGRAMS IS LIMITED

More than $7.5 million was available for DEQ's litter prevention and recycling activities in FY 2007. However, the majority of that amount was dedicated to waste tire management and grants for local litter prevention and recycling activities. Moreover, localities typically choose to use most of this grant funding for litter prevention activities. Other states contacted for this review separate their litter prevention and recycling grant funds.

Majority of $7.5 Million Available for Waste Reduction Was Spent on Waste Tire Management

Revenues for waste reduction activities at the State and local levels amounted to $7.5 million in FY 2007, almost all of which was non-general fund monies, as shown in Figure 9. Of this amount, revenues from the waste tire fee accounted for $5.2 million (69 percent). Revenue generated by this $1.00 fee can only be used to clean up piles of illegally dumped tires in the Commonwealth and for the recycling of tires collected as part of daily automotive operations. Revenues from the general fund accounted for three percent of total revenues dedicated to waste reduction activities in FY 2007.

The State provided grants to the localities when the solid waste management plans were first required. These grants were funded through a federal EPA grant, according to DEQ staff. However, no funding assistance was available to localities when they were required to update and submit their plans by July 1, 2004.

The General Assembly has also created two tax credit programs to assist with the capital costs associated with purchasing recycling-related equipment. The waste motor oil tax credit is for the purchase of equipment which burns waste oil accepted from the public. Another tax credit is for pollution control equipment. The State has provided approximately $4.3 million in tax credits for the purchase of recycling equipment since 2000.

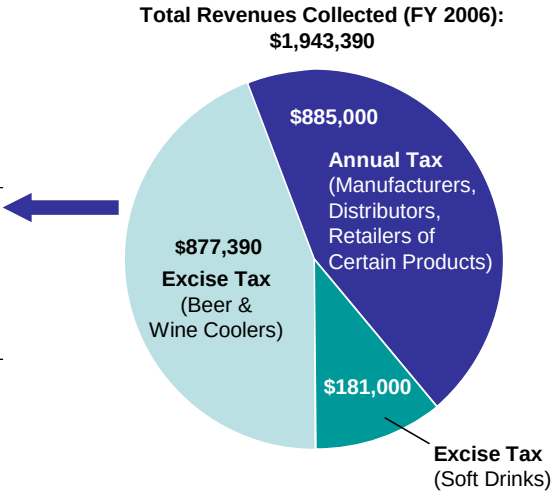
Funding for local program activities is also provided from the State Litter Control and Recycling Grant Fund (*Code of Virginia,* §10.1-1422.01). As shown in Figure 9, revenue from three litter taxes paid into the fund totaled more than $1.9 million in FY 2007. The figure also indicates the amount levied by each tax and its source. As shown, two of the three taxes levy an excise tax on wholesalers of beer, wine coolers, and carbonated soft drinks. The third imposes an annual tax on the manufacturers, wholesalers, distributors, or retailers of certain products.

In 2007, Virginia provided $1.6 million to the Litter Prevention and Recycling Grant program. Ninety percent of these tax revenues fund the non-competitive locality grants, five percent fund the competitive grants, and five percent of revenues go to DEQ for administering the grants. Each locality in the Commonwealth is eligible to receive a non-competitive litter prevention and recycling grant. To receive the grant, localities must submit an application and a performance and auditing report for any grant funds received in a previous year. Once the locality has made these sub-

Figure 9: DEQ Waste Reduction Revenues and Expenditures From Litter Taxes (FY 2007)

	General Fund	Federal Grants	Tire Fees	Litter Taxes
Revenues	$206,735	$110,218	$5,173,385	$1,624,908[a]
Expenditures	$206,735	$110,218	$3,227,945	$1,532,186

[a] Includes interest on funds carried over, unexpended local funds, and budget reduction pursuant to Section 3-1.01 MM from the 2005 Appropriation Act.



Source: Data provided by DEQ and the Departments of Taxation and Alcoholic Beverage Control, summer 2008.

missions, DEQ distributes grant funds based on the locality's population and road miles. The program also provides competitive grants, for which localities and certain non-profit organizations may submit project proposals. Non-profits applying for competitive grant funding operate in conjunction with local governments to carry out activities on behalf of the localities. A five-member Governor-appointed board reviews these proposals, and makes funding recommendations to the director of DEQ.

Purchasing Power of Local Grant Funding Has Declined

Litter taxes are not levied as a percentage of the price of goods sold, and as such have not kept pace with the increasing cost of such goods, as the State's sales tax does, for example. Inflation has also reduced the value of the revenue being generated by these taxes. For example, the annual tax levied under the litter tax (*Code of Virginia*, §58.1-1707) has been at $10 or $25 since 1981 but is worth $23 or $57 in 2007 dollars. Table 6 identifies the tax rate if all three taxes were adjusted for inflation. Because the taxes are not adjusted for inflation, the grant funding available each year continues to lose purchasing power despite rising program costs at the local level.

Furthermore, current funding for the litter prevention and recycling grant programs is similar to the funding level the State estimated would be necessary to operate a litter control-only program in 1977. The 1977 General Assembly directed the Department of Conservation and Economic Development to study options for implementing a statewide litter control program and funding such a

Table 6: Tax Rates Have Not Kept Pace With Inflation

Tax	Last Year Tax Was Adjusted	Taxed Entity	Tax Rate	Tax Rate Inflated to 2007 Dollars
Annual Tax[a]	1981	Manufacturers, wholesalers, distributors, and retailers of certain products	$10 or $25 per establishment	$23 or $57 per establishment
Excise Tax (Beer and Wine Coolers)[b]	1993	Barrels	$0.2565 per gallon	$0.38 / gallon
		Up to 12-oz bottle	$0.02-0.0265 per bottle	$0.03-0.038 per bottle
		More than 12-oz bottle	$0.0022 per oz	$0.0032 per oz
Excise Tax (Soft Drinks)[c]	2002	Soft drink receipts	$50 (minimum) - $33,000 (maximum)	$58-$38,041

[a] The $10 tax applies to human or pet food, wine, cigarettes and tobacco products, newspapers and magazines, paper products, glass containers, metal containers, plastic and fiber containers, cleaning agents and toiletries, nondrug drugstore sundry products, distilled spirits, motor vehicle parts, **groceries, soft drinks and other carbonated waters, and beer and other malt beverages**. (An additional $15 tax applies to products in bold.)
[b] Paid by the manufacturer, bottler, or wholesaler selling beer or wine coolers to licensed retailers.
[c] Paid by every wholesaler and distributor of carbonated soft drinks based on their annual gross receipts.

Source: JLARC staff analysis of *Code of Virginia* §4.1-236, §58.1-1702, §58.1-1707; U.S. Bureau of Labor Statistics Consumer Price Index.

program's implementation. The department found that to implement a litter control program administered from regional offices, along with a robust public education program, the State would need to allocate approximately $1.5 million annually. This is roughly the same amount available through the competitive local grant program in FY 2007 for both recycling and litter prevention.

Approximately Two-Thirds of Local Grant Awards Are Used for Litter Prevention Activities

Litter prevention activities are not the same as recycling activities because litter prevention activities do not consider how the waste is disposed. As a result, litter prevention programs are often distinct from recycling programs. Examples of litter prevention activities include purchase of car litter bags, funding a litter coordinator position, and Adopt-A-Highway projects. Recycling activity examples include collection of curbside recyclables, purchase of recyclable drop-off containers, and purchase of educational materials. Although recycling and litter prevention activities do not necessarily have to be distinct programs, in cases where they are, the two programs often compete for funding, with litter prevention programs garnering the majority of available Litter Prevention and Recycling grant funds.

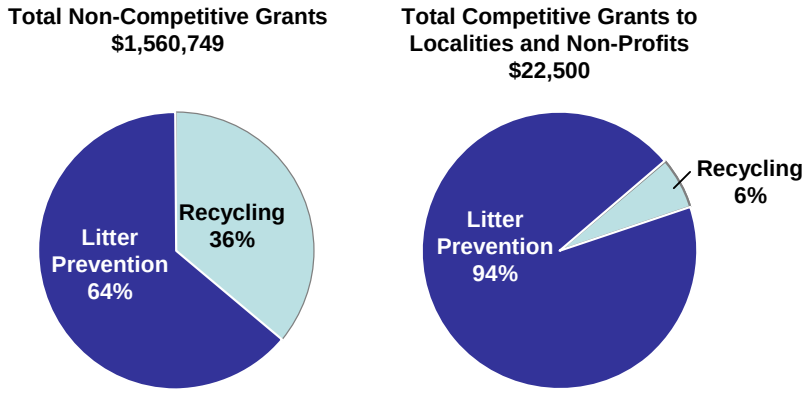
While the non-competitive Litter Prevention and Recycling grant is the only funding the State provides solely to localities for their

litter prevention, recycling, and waste reduction activities, most localities choose to spend their grant funds on litter prevention activities. According to DEQ data, approximately 64 percent, or $998,879, of non-competitive grant funds were used for litter prevention activities, while 36 percent, or $561,870, were used for recycling activities (Figure 10).

This may represent a historical trend. The State began awarding grants to localities for litter prevention and control activities in 1977. Ten years later in 1987, the program was amended to a litter prevention and recycling program. Localities may have simply continued to use their grant funds for litter prevention, rather than re-direct the funds to recycling programs. However, in 1990, the Commonwealth began requiring localities to operate recycling programs, while the *Code of Virginia* does not directly require localities to operate litter prevention programs. Despite the historical trend, localities are required to meet recycling mandates, but there are no similar litter prevention requirements.

The majority of competitive grant funds, which are available to both localities and non-profits, have been awarded for litter prevention rather than recycling activities. According to DEQ data, litter prevention programs historically have received a majority of the competitive grant funding; between FY 1997 and FY 2008, litter prevention programs were awarded approximately 63 percent of available funds. As shown on Figure 10, in FY 2007 litter prevention programs received approximately 94 percent, or $21,250, of available funding while recycling programs received approximately six percent ($1,250).

Figure 10: Litter Prevention Activities Accounted for Majority of Waste Reduction Grant Funding in FY 2007



Source: DEQ, *Local Government Grant Program Performance and Accounting Summary, FY 2007* and JLARC staff analysis of DEQ data.

Other States Provide More Grant Funding for Waste Reduction Activities

Other states contacted for this review indicated that they provide grant funding for waste reduction activities, including recycling, separately from litter prevention activities. In addition, they provide more grant funding for their waste reduction programs than Virginia when the Commonwealth's litter prevention funding is excluded.

Table 7 identifies annual grant funding for waste reduction in Virginia and selected other states. Of the states shown, only Maryland provided less grant funding for waste reduction activities than Virginia.

Table 7: Selected Other States Provide More Grant Funding to Waste Reduction Programs

State	Annual Grant Funding Dedicated to Waste Reduction
Maryland	$0.2 million
Virginia	**$0.6 million**
North Carolina	$0.8 million
West Virginia	$1.4 million
Kentucky	$1.5 million
South Carolina	$4.8 million
Tennessee	$6.9 million
Pennsylvania	$44.0 million

[a] Amount represents the most recent data provided by each state's staff, but fiscal years in which each amount was made available may vary.

Source: JLARC staff interviews and document reviews.

(At the September 8, 2008 meeting, the Commission directed JLARC staff to identify the amounts spent by localities in the states identified in Table 7 for waste reduction activities. The Commission raised the issue because Virginia's reported recycling rate is greater than the rates reported in some selected other states, although Virginia provides less State grant funding for waste reduction efforts. This information is included as Appendix H. Of the seven states contacted, two provided actual spending amounts while the other five states were unable to provide this information. Staff in two states that could not provide actual spending amounts indicated their belief that the localities spent substantially more than the state for such efforts.)

DEQ Should Consider Creating Separate Grant Funds

While locality staffs generally expressed that the State needs to direct more funding to local waste reduction programs, many localities choose to spend most or all of their Litter Prevention and Re-

cycling grant on litter prevention and control activities. DEQ should conduct a review of local recycling and litter prevention funding needs in order to determine a minimum amount of funds necessary for recycling activities. The department should report this amount to the General Assembly by the 2010 Session. Based on the information reported by DEQ, the General Assembly may wish to consider amending the *Code of Virginia* to create separate funds for local recycling activities and local litter prevention activities.

Recommendation (1). The Department of Environmental Quality should determine the funding needs of local recycling and litter prevention efforts and report the amounts needed to fully fund each to the General Assembly by the 2010 Session. The General Assembly may wish to consider creating a separate fund from which to provide grant funding for local recycling efforts.

Chapter 5

State Efforts to Help Achieve Reductions in Waste Disposal

In Summary

With the constraints of limited resources, State activity addressing waste reduction issues has been diminished. DEQ's review of local solid waste management plans has been slow, which DEQ staff attribute to a lack of resources. There is little public outreach by the State to encourage waste reduction activity. State efforts to develop recycling markets have not been effective, in part because few resources have been allocated. Other states in the mid-Atlantic region have been more active at improving access to recycling markets. DEQ's waste tire management program appears to have made measurable progress due to the dedication of financial and staff resources, while the used lead-acid battery program appears to have been successful as a result of already existing markets for batteries. The success of the used motor oil, oil filters, and auto fluids management program is difficult to assess because of a lack of data on the use and disposal of these materials. However, it is known that few resources have been dedicated to the program.

As the State's lead agency for waste reduction efforts, DEQ administers a variety of waste reduction programs. In particular, DEQ oversees solid waste planning efforts, provides technical assistance to localities, compiles the annual recycling rate reports, administers the Litter Prevention and Recycling grants program, and operates three material-specific programs. These efforts aim to curb the increase in the amount of Virginia's waste that is disposed, but a stronger State role than the one currently in place may be necessary. In addition to DEQ, the Virginia Recycling Markets Development Council and the Department of Business Assistance have statutory authority to encourage and promote recycling industries or markets. The Department of Education is required to develop guidelines for public schools to develop and implement recycling programs.

DEQ REVIEW OF LOCAL SOLID WASTE PLANS HAS BEEN SLOW AND PLANNING ASSISTANCE HAS BEEN LIMITED

The *Code of Virginia* requires local solid waste planning units (SWPUs) to develop and implement solid waste management plans. The plans must integrate recycling and waste reduction activities into the overall waste management program. Statute requires DEQ to review all plans. Such plans were first required by legislation passed in 1990, and DEQ first began receiving plans from localities in 1994. In 2001, the Virginia Waste Management

Act was amended to require that localities revise and re-submit their plans to DEQ by July 1, 2004.

These plans are a critical component of the State's waste management efforts, according to DEQ staff. Collectively, the plans act as the State's waste management and reduction plan, while individual plans can be tailored to a locality's unique situation. By reviewing the plans, DEQ can ensure that each locality has committed to a minimal level of waste reduction and identified ways of accomplishing that level. Additionally, the requirement for DEQ to review locality plans indicates that the State values solid waste management planning. That value placed on solid waste management planning is also incorporated in regulations (9VAC20-80-30) whereby planning is the first component of the State's waste management hierarchy.

In 2004, DEQ staff developed guidelines and hired a contractor to do the technical review of the plans. DEQ staff reviewed the plans to ensure that they were complete and then sent the completed plans to the contractor for a technical review according to DEQ's guidelines. Any deficiencies were reported to localities, who were to revise and re-submit their plans. DEQ responded to all locality submissions within the required 90 days. However, statute and regulations do not place any time constraints on DEQ after that initial response, except that regulations require DEQ to prioritize plan reviews where a SWPU has a pending permit application, which DEQ has done. If a locality does not submit an adequate plan, DEQ withholds approval of the plan, and a permit cannot be issued or amended to any solid waste facility within the locality. Additionally, the regulations require that SWPUs with approved plans submit a letter certifying that the plan is current on the fifth year anniversary of the plan's approval; if the plan is not current, the locality would need to submit amendments to its plan.

Twenty-Eight Percent of SWPUs Do Not Have an Approved Plan

According to DEQ staff, local solid waste management planning is critical to Virginia's solid waste management effort. Nonetheless, although plan reviews began in 2004, as recently as June 2008, 40 percent of SWPUs' plans had not been approved by DEQ. At the time, the department was reviewing 18 of the plans and 12 were being revised by the SWPU. As of August 26, 2008, the department had reviewed all plans and approved a total of 53; still, approximately 28 percent of the SWPUs' plans are not completed and have not been approved by DEQ as of the August 26 date. As Table 8 illustrates, all of the plans not yet approved are being revised by the SWPU.

Table 8: Solid Waste Management Plans Are at Different Stages of the Review Process

Stage of Review Process	June 2008 Number of Plans	June 2008 Percent of SWPUs	August 2008 Number of Plans	August 2008 Percent of SWPUs
Submitted to DEQ	**74**	**100.0%**	**74**	**100.0%**
Approved	**44**	**59.5**	**53**	**71.6**
Fully approved	39	52.7	52	70.3
Conditionally approved	5	6.8	1	1.4
Not approved	**30**	**40.5**	**21**	**28.3**
Under review at DEQ	18	24.3	0	0.0
Awaiting SWPU response	12	16.2	21	28.3

Source: Information provided by DEQ, June 2008 and August 2008.

Although localities may be implementing the components of their plan without DEQ approval, the department's review is important to ensure that those components are consistent with the laws, regulations, and guidance comprising the State's solid waste management program. In addition, not reviewing the plans in a timely manner implies that planning is not important.

Approval of Plans Has Been Slow and Localities Received Little Assistance With Plan Development

When the 2004 planning requirements were enacted, DEQ did not receive any additional funding for reviewing plans. As a result, only about 25 to 30 percent of one full-time position organized within the Waste Division is devoted to reviewing plans. DEQ's use of a contractor helped to expedite the initial reviewing process in 2004—in most cases, SWPUs received approval or comments on their initial plan submission within 90 days. However, if the initial plan was not approved and the SWPU needed to submit responses and amendments to the plan, DEQ appears to have taken extended periods of time to review and respond to these submissions. In the past, when SWPUs were not meeting their recycling rate, DEQ requested that the SWPU submit a recycling action plan (RAP) to identify how the SWPU intended to address the deficiency. Submitting a RAP was made a regulatory requirement in 2007. The following case studies illustrate how several localities have been engaged in the plan review process for several years, and each still lacked an approved plan as of July 2008.

Case Studies

A locality initially submitted its plan in December 2004. DEQ responded with comments regarding its deficiencies 90 days later in March 2005. The locality submitted its response to DEQ within 60 days of receipt, in May 2005. DEQ

did not acknowledge receiving this response until October 2005, 161 days later. In its receipt letter, DEQ informed the locality that it would need to file a recycling action plan (RAP) within 45 days, and that comments on the plan amendments would be provided in a future letter. The locality submitted the RAP within the 45-day window, and DEQ accepted it 13 days after receipt. However, DEQ did not provide comments on the plan amendments until April 2008, two years and 11 months later (approximately 1,065 days). In its April 2008 letter, DEQ requests that the locality provide its response within 90 days. According to the department, because the SWPU did not have a pending permit application, the plan was not a priority for the department or the planning unit pursuant to regulatory requirements regarding prioritization.

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A locality initially submitted its plan in July 2004. DEQ submitted its comments to the locality regarding the plan's deficiencies in November 2004. The locality provided DEQ with a revised plan addressing the deficiencies in February 2005. Approximately 250 days later (or eight months) in October 2005, DEQ sent the locality a letter which requested that a RAP be submitted within 45 days and informed the county that a future letter would address the revised plan submitted in February. The locality submitted a letter in November 2005 stating the RAP would require considerably more than 45 days to develop. Nonetheless, by January 2008, two years and 11 months later, the locality still had not submitted a RAP. DEQ sent the locality a second letter requesting it submit a RAP and informing the locality that it would address the revised plan in a future letter. When the locality submitted its 2007 recycling rate report in April 2008, the reported rate was above 25 percent, and a RAP was no longer required. In August 2008, over three years after the locality submitted its revised plan, DEQ approved the locality's plan.

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A locality submitted its initial plan to DEQ in April 2008, almost four full years after the July 1, 2004 deadline. DEQ sent a letter to the locality regarding the plan 57 days after the plan was due. After several phone conversations and correspondences between the locality and DEQ in July 2005, approximately 392 days after the plan was due, the department issued a warning letter indicating that the locality might be in violation of the Waste Management Act if it did

not submit a plan. The locality hired a contractor to develop a plan in December 2005. By December 2007, the locality still had not submitted a plan to DEQ, and DEQ staff contacted the locality. The locality submitted a plan to DEQ in April 2008, approximately three-and-a-half years (1,385 days) after it was due.

Localities Receive Little State Assistance Developing and Submitting Plans. Developing a solid waste management plan has generally been a resource-intensive endeavor for localities. According to DEQ staff, few resources were available at the department for development and review of solid waste management plans, and as a result, the State did not offer localities much assistance. DEQ staff estimated that the average cost to a locality for developing a plan was $10,000, but many localities have reported spending significantly more. The average plan cost about $47,000 for localities operating as their own SWPU who responded to the JLARC staff survey of local recycling programs, while the maximum such a locality spent was $325,000. A majority of these independent localities—63 percent—also reported hiring a consultant to develop and draft their plans. Regional bodies such as the Central Virginia Waste Management Authority generally reported spending less on their plans than independent localities, with the average plan costing $25,000, and the most expensive plan costing $60,000. Of the regional bodies that responded to the survey, 46 percent hired consultants to develop their plans.

DEQ staff indicated that the department offered regional workshops to assist with planning before plans were due in 2004; however, few localities appear to have taken advantage of those workshops. Fifty-four percent of independent localities that responded to the JLARC staff survey reported having no contact with DEQ regarding the development and review of their plan. Additionally, most locality staffs interviewed by JLARC staff indicated that they received little or no assistance from DEQ with developing their plans.

Incentive for Plan Approval May Not Be an Effective Tool. There may be few incentives for SWPUs to complete their waste management plans in a timely manner. Amendments made to the *Code of Virginia* in 2007 allow DEQ to reject permit applications for solid waste management facilities, such as landfills, that are filed by an SWPU that does not have an approved plan; however, if the SWPU is not applying for such a permit, it may have little incentive to invest resources in developing an adequate plan. Furthermore, DEQ staff indicate that they have prioritized reviewing plans from SWPUs with pending permit applications. While DEQ states in its document "FAQs for Local Government Solid Waste Management Planning" that it can address failure to submit a

complete, revised plan through a variety of options ranging from compliance assistance to enforcement orders with civil charges, DEQ staff indicate that the department has limited its compliance and enforcement actions regarding plans to providing assistance.

Selected Regional States Appear to Offer Their Localities More Assistance for Planning

Similar to Virginia, West Virginia also requires its regional solid waste authorities to develop and update solid waste management plans for their jurisdictions. State personnel offer technical assistance to localities developing or updating a plan. In addition, West Virginia allows localities to apply for grant money for the purpose of developing or updating a plan; no similar grant funding is available in Virginia. West Virginia also uses this grant as an incentive—if a locality does not have a current and approved plan, the locality can only apply for funds to assist with the costs of developing a plan.

North Carolina also requires its localities to develop and maintain solid waste management plans, and provides localities with technical assistance through two state-level offices and dedicates full-time staff to this assistance function. Additionally, the state publishes extensive guidance documents for developing local plans, which include worksheets and checklists.

STATE HAS CONDUCTED LITTLE PUBLIC OUTREACH TO ENCOURAGE WASTE REDUCTION, BUT PUBLIC SCHOOLS PRESENT OPPORTUNITIES

Public outreach and education performed by local recycling coordinators and via other media provides a consistent message about the benefits of recycling throughout the State. According to interviews conducted for this review, more public education and outreach regarding recycling took place in Virginia previously. During the late 1980s and into the early 1990s, the State was able to provide local and State agency recycling coordinators with educational materials promoting recycling. The Department of Waste Management (DWM) also sponsored a television commercial promoting recycling. Performing public outreach and education through local coordinators and other media provides a consistent message about the benefits of recycling throughout the State. Staff at a planning unit told JLARC staff that their biggest problem was a lack of funding for public education. Also, not all State officials are convinced of the need for on-going public education. For example, a member of a State Board contacted for this review expressed doubt that further education and outreach about recycling would be effective since by now, the Board member said, everyone should know what the benefits of recycling are.

One target for a public education and outreach campaign would be the State's public schools. Providing greater outreach to students, especially younger students, was frequently mentioned by staff at planning units in Virginia and by waste reduction staff in other states as having the potential to substantially improve waste reduction in the short and long terms. Such a campaign was anecdotally compared to the success of seatbelt outreach campaigns in the schools. Planning unit staff contacted for this review indicated that both North and South Carolina provide grants to schools for such education and outreach activities. Within the past year, the Virginia Recycling Association has been holding training seminars designed to increase recycling in public schools.

In 1990, the Department of Education (DOE) was required by statute (§10.1-1425.9 of the *Code of Virginia*) to "develop by July 1, 1992, guidelines for public schools regarding (i) the use of recycled materials, (ii) the collection of recycled materials, and (iii) the reduction of solid waste generated in such school's offices, classrooms, and cafeterias." The guidelines DOE was required to develop are very similar to the guidelines developed by DWM for State universities and agencies. According to interviews with DOE staff, the department chose not to develop such guidelines at the time because DWM was undertaking a similar activity. It was also suggested that since the guidelines being developed by DWM would apply to the localities, the localities would then implement them at the public school level. However, whether such guidelines were ever intended to be applied to the localities is questionable. DWM was tasked with developing guidelines for State agencies and universities, not localities. Therefore, DOE should develop guidelines for public schools regarding recycling and waste reduction as required by statute. In developing such guidelines, DOE should consult with stakeholders, including school administrators, DEQ, recycling coordinators, the Virginia Recycling Association, and others.

Recommendation (2). The Department of Education (DOE) should develop guidelines for public schools regarding recycling and waste reduction activities pursuant to §10.1-1425.9 of the *Code of Virginia*. In developing such guidelines, DOE should consult with school administrators and staff, Department of Environmental Quality staff, local recycling coordinators, the Virginia Recycling Association executive officers, and other stakeholders as necessary.

EFFECTIVENESS OF STATE EFFORTS TO LOCATE AND DEVELOP RECYCLING MARKETS HAS BEEN LIMITED

The importance of markets for materials collected for recycling cannot be overstated. Revenue derived from the sale of recyclables

helps to offset the cost of collecting the material. Equally as important as the revenue is the avoided cost of landfilling the collected material. Several studies have addressed recycling markets in Virginia. To improve the viability of markets in the Commonwealth, the General Assembly created the Virginia Recycling Markets Development Council (VRMDC) and enacted legislation directing the Department of Business Assistance (DBA) to encourage and promote the establishment of recycling industries in Virginia. Such calls for recycling market development have not been limited to Virginia; the U.S. Department of Commerce has been directed to take similar actions. While State action has helped establish viable markets for waste tires, such assistance with regard to other materials has not been as productive.

With Delaware, Maryland, North Carolina, Pennsylvania, West Virginia, and the District of Columbia, Virginia belongs to a regional organization, the Mid-Atlantic Consortium of Recycling and Economic Development Officials (MACREDO), which sees recycling market issues as part of its scope. However, its resources to perform projects is limited. Certain other states contacted for this review have indicated greater success in identifying and developing markets than Virginia.

State Has Previously Reviewed Issue of Developing Recycling Markets

Recognition of the need to develop markets for recyclable material is not new. Between 1989 and 1991, six such studies were conducted. Prior to that, a 1988 legislative study indicates that DWM recommended that "recycling be encouraged by stimulating markets through the development of tax incentives, education in the community, etc." The 1989 General Assembly appropriated $100,000 for "studies of recyclable materials and strategies for increasing use of recyclable materials." In 1990, a joint committee reported that efforts to encourage recycling businesses to locate in Virginia were already occurring at the State and local levels.

Using the $100,000 appropriated by the 1989 General Assembly, DWM contracted with a private firm to conduct a market study for recyclable materials. The study noted that under Virginia's approach to recycling, localities were responsible for identifying and developing their own markets. Recommendations included developing a statewide recycling program administered by DWM; making DWM responsible for siting, permitting, and approving all facilities involved in the collection, sorting, processing or manufacturing of recyclables; and requiring governmental entities to purchase products manufactured or produced from recyclables. The report also recommended targeting businesses and governmental operations through any recycling program because such en-

tities are generally producers of quality recyclables in heavy volume, and their collection would be easier to monitor under a mandated program. According to DEQ staff, the report was received, but the recommendations were never implemented.

In 1992, a joint subcommittee was created to develop recommendations to create or stimulate recyclable markets in Virginia. The subcommittee made several recommendations, including creation of the VRMDC. Other recommendations focused on amending State procurement rules to encourage the purchase of products with recycled content, permitting waste tire end users to receive payments from the Waste Tire Trust Fund, and having the Department of Economic Development continue assisting industries related to the use of newsprint. Seven of the subcommittee's recommendations were enacted into statute.

State Entities and Regional Group Have Not Been Effective With Developing Recycling Markets

Virginia still has limited markets for some recyclable materials. Respondents to the JLARC staff survey of local recycling programs indicated a need for State assistance in identifying and developing markets for the materials they collect. The entity created specifically for this purpose and DBA have been limited by resource constraints from providing greater assistance.

Localities throughout the State consistently cited a need for more assistance with marketing the recyclables they collect. Approximately 57 percent of localities responding to the JLARC staff survey of local recycling programs recommended increasing the State's role in finding markets for recyclable materials. One locality identified a need for "efforts to further develop markets," explaining that increasing the demand for recyclable materials "will help make recycling at the local level more cost-effective." A recommendation addressing improving markets for recyclables in Virginia appears in the final chapter of this report.

VRMDC Has Not Been Able to Develop Recycling Markets in Virginia. VRMDC was established by the 1993 General Assembly as an advisory council with non-legislative members appointed by the Governor. The council's members represent local governments, urban and rural planning districts, and representatives of the waste collection and recycling industries and are directed to meet quarterly. Representatives from DEQ, DGS, VDOT, and DBA serve as ex-officio members.

Charged with coordinating the State's effort to promote and identify markets for recyclable materials in Virginia, the council had many other responsibilities, including identifying financial and

other incentives to locate businesses using recycled products to Virginia and developing a plan to strengthen the State's recycling markets infrastructure. However, VRMDC appears not to have achieved its mission. In 2004, a joint subcommittee studying Virginia's boards and commissions initially recommended elimination of the council, and the governor's office concurred with this decision. Instead of eliminating the council, however, the 2004 General Assembly amended its duties to include the following responsibilities:

- assist local and regional governments and State agencies with meeting their recycling rates and "identifying markets for recycled or recovered materials;"
- identify and evaluate State law, regulations, or policies that may impact entities engaged in an aspect of recycling;
- "facilitate access to markets for recycled or recovered materials collected by local governments, authorities, businesses, and residents of the Commonwealth"; and
- serve as a standing or joint study committee for the Governor or General Assembly.

Despite a change in its mission, the council still appears ineffective. More than half of the State agencies and institutions of higher education responding to the JLARC staff survey indicated that they believed increasing the State's role in finding and developing markets would address or improve Virginia's long-term solid waste reduction goals. However, only two of the 82 respondents indicated requesting assistance with finding markets for their recyclable materials from VRMDC. A similar pattern was found among responses to the JLARC staff survey of local recycling programs. It has been suggested to JLARC staff that the council's most important contribution to the State's recycling effort was in holding public meetings in 2005 that eventually led the council to recommend creating the two-tiered mandatory recycling rate requirement currently in place. It appears that the council now serves to answer questions from localities about their recycling programs and as an educational body or clearinghouse on new developments in the recycling field.

Some current and former council members have indicated that a lack of resources limits its ability to undertake any initiatives. The council operates without dedicated staff so members must provide administrative as well as policy activities. Citizen members of the council also receive no compensation for their service. As a result, JLARC staff were told that it can be difficult to get members to devote adequate time to the council's work.

In light of its current status, the General Assembly may wish to consider eliminating the council and creating a full-time position organized within DEQ that would be responsible for identifying and developing recycling markets in Virginia. Such changes should be contingent upon the availability of new funding for an additional position, as will be discussed further in Chapter 10. As will be discussed in more detail later in this report, certain other states contacted for this review indicated they have dedicated positions and funding for such a function.

Department of Business Assistance Not Engaged in Developing Recycling Markets. The *Code of Virginia* requires DBA to assist DWM with encouraging and promoting the establishment of appropriate recycling industries in the Commonwealth. However, discussions with DBA staff indicate that this is not happening. In fact, JLARC staff were told that the department currently has no initiatives to encourage the establishment of recycling industries. Furthermore, DBA staff stated that such activities may not fall within the agency's responsibilities.

In 2006, the U.S. Government Accountability Office (GAO) found similar issues with the U.S. Department of Commerce's effort to promote recycling markets nationwide. GAO's report criticized the Commerce Department for not identifying existing or potential markets as well as economic and technical barriers to the increased use of recyclables. GAO also stated its concern that Commerce was not taking any action to stimulate the development of new uses for recyclables in the nation.

MACREDO Has Been Limited in Developing Markets In Virginia. MACREDO is a regional body of state recycling and economic development staff from Virginia, West Virginia, Maryland, Delaware, Pennsylvania, and the District of Columbia, which aims to identify, develop, and promote recycling projects and opportunities in the region. However, MACREDO is not in a position to provide recycling market assistance to Virginia's localities. MACREDO largely provides information and networking opportunities for state-level staff, but it does not have the resources to provide assistance to localities. The organization hosts a database of recycling processors and end users in Virginia, but members of the organization indicate that this database may be out of date.

Other States Have Been More Active In Recycling Market Identification and Development

Respondents to the JLARC staff survey of localities cited a need for increased State involvement with developing recycling markets as a way to improve Virginia's recycling effort. Such efforts appear to be under way in nearby states. Market development programs

are operating in neighboring and selected other states that are using positions and funding dedicated to the function. Of the states selected for comparison to Virginia, Pennsylvania and North Carolina appear to have made the most effort with recycling markets. Along with several other states, North Carolina and Pennsylvania have staff dedicated to providing technical assistance to businesses that process or use recyclable materials and have user-friendly online directories for recycling markets. These two states also have grant money available to assist existing businesses and help develop new markets.

Pennsylvania Relies on Financial Assistance and the Recycling Markets Center to Assist Markets. In Pennsylvania, two full-time employees at the state's Department of Environmental Protection (DEP) spend at least a portion of their time on recycling markets. Additionally, the state relies on the Recycling Markets Center (RMC) housed at Penn State University-Harrisburg, with a staff of five.

DEP administers two competitive grants for the purchase of equipment and machinery by businesses and non-profits that demonstrate that their projects will increase consumption of recyclables from the state. Funding for these grants comes from a surcharge on tipping fees at the state's landfills. The Recycling Markets Infrastructure Development Grant awards about $1,000,000 annually; in 2008, a $500,000 grant went to a project for processing mixed broken glass into an abrasive for sandblasting. Mixed broken glass is commonly recovered in single-stream recycling collection systems but has few uses. In addition to this grant, the Compost Infrastructure Development Grant awards about $400,000 annually. The latter grant targets organic waste, which was identified in a 2002 waste composition study as comprising more than one-third of the trash disposed in the state's landfills.

RMC is a non-profit organization established in 2004 by a grant from DEP, which also provides yearly funding. With a staff of five, the RMC negotiates funding packages for new recycling businesses and helps develop markets for its identified priority materials—plastic, organics, tires, and glass. RMC facilitated negotiations allowing the recipient of the above-mentioned $500,000 grant to use a patented technology for imploding rather than pulverizing glass.

North Carolina Touts Technical Assistance and Online Directory to Link Materials to Markets. In North Carolina, the Division of Pollution Prevention and Environmental Assistance (DPPEA) and the Department of Commerce partnered to create the Recycling Business Assistance Center (RBAC). RBAC has a full-time staff person providing technical assistance to recycling businesses looking for

financing, finding material, and building infrastructure. Other positions at RBAC may also provide such support. According to RBAC staff, having a dedicated position is helpful in building and sustaining personal relationships with the business community.

RBAC awards business development grants, giving priority to grant applications for projects that address the materials that are banned from the state's landfills. Grant funds are limited, however, with about $300,000 awarded annually since 2005, and the grants are not restricted to end users of recyclables. North Carolina also offers a tax exemption on equipment and facilities used exclusively for recycling and resource recovery. Funding for these grants comes from advance disposal fees on the purchase of white goods (major household appliances) and new tires.

Despite limited financial assistance, markets are considered strong in the state. In fact, demand for recyclables exceeds supply, according to state staff. The state's role, therefore, has primarily been to facilitate the link between suppliers, processors, and end users of recyclables. According to staff, the state's online Recycling Markets Directory has been very effective at doing this. The directory, administered by RBAC, gets a "tremendous" amount of use and represents one of the state's most significant waste reduction efforts, according to staff at DPPEA.

RBAC also administers the state's online recycling market directory. The directory is searchable by material or company name. Lists of companies for each type of material include the company's name, location, and phone number, with another link to more specific information for each company. Businesses can submit their name to the list electronically or by phone, and help using the directory is also available both online and by phone. The online directory is available to Virginia localities as well.

Other States Also Provide Dedicated Staff and Funding for Development of Markets. In addition to Pennsylvania and North Carolina, JLARC staff contacted other states to identify their market development activities. Among those contacted, Tennessee, Maryland, West Virginia, and South Carolina provide different levels of assistance regarding recyclables markets.

In Tennessee, the Recycling Market Cooperative for Tennessee (RMCT) acts as a broker for recyclable material from different localities throughout the state. It is a non-profit organization with two staff that receives about $75,000 a year from the state, and also receives funds from EPA and U.S. Department of Agriculture Rural Development. The RMCT's mission is to "market Tennessee's recyclables through community cooperation and education" and also to provide technical assistance to recycling programs.

They do site visits, help establish or expand recycling programs, locate grant funding and help with applying for grants, and assist with finding heavy equipment needed for recycling operations. According to the executive director, RMCT focuses on helping smaller counties that produce a lower volume of materials and have difficulty finding markets. RMCT services are available to all local governments without charge and to businesses for a small fee.

Maryland Environmental Services (MES) is a self-supporting nonprofit corporation that runs environmental projects and provides expertise to state and local governments and the private sector. MES has a recycling programs manager, and staff also operates a materials recovery facility (MRF) in one county. The MES recycling programs manager was able to arrange for the MRF to expand the amount and type of materials it collects by negotiating very competitive prices for these materials. The manager attributes this success to his longstanding, close relationship to the businesses that bid on MES contracts.

The mission of South Carolina's Recycling Market Development Advisory Council is to track the success and growth of the state's recycling industry, which includes more than 300 companies. Organized within the state's Department of Commerce, the council has two FTEs who work on recycling markets and receives funding from a line item in the budget of the South Carolina Department of Health and Environmental Control. That budget (as well as the state's entire waste management and waste reduction staff and programs) is funded by the state's advance disposal fees on motor oil, automotive batteries, tires, and appliances.

SUCCESS OF MATERIAL-SPECIFIC PROGRAMS ADMINISTERED BY DEQ DEPENDS ON RESOURCES AND MARKETS

Three material-specific programs administered by DEQ appear to contribute to the State's overall waste reduction effort. The programs, (1) waste tire management, (2) used lead-acid battery, and (3) used motor oil, filters, and auto fluids management, are designed to ensure proper disposal of materials that present environmental and health hazards when improperly disposed. The three programs, although having similar goals, have taken different approaches to achieving their aims and have had varying levels of success. The waste tire program appears to have succeeded because the program developed markets for waste tires and has supported their continuing existence. The lead-acid battery program appears to have succeeded due to already-existing robust markets. The effectiveness of the used oil, filters, and auto fluids program is difficult to assess due to the lack of data on the use and disposal of these materials.

When improperly disposed, tires, lead-acid batteries, and used motor oil can present hazards to human health and the environment. For example, the petroleum content of a tire makes it a fire hazard that can cause air, water, and land contamination that can take years to fully remediate. In 1983, a fire involving five to seven million tires in Frederick County burned for nine months, polluting the air in three states, and polluting local water sources. Virginia has also experienced tire pile fires in Roanoke, Bedford, and Dinwiddie Counties, and the City of Richmond and Town of Wakefield. Tires can also serve as breeding grounds for mosquitoes and pests, such as rodents. Improper disposal of lead-acid batteries can present environmental hazards due to the heavy metals the batteries contain. And EPA indicates that one gallon of used oil has the potential to contaminate up to one million gallons of fresh water if the oil is poured on the ground or down a drain. Used oil can also contain toxins and heavy metals.

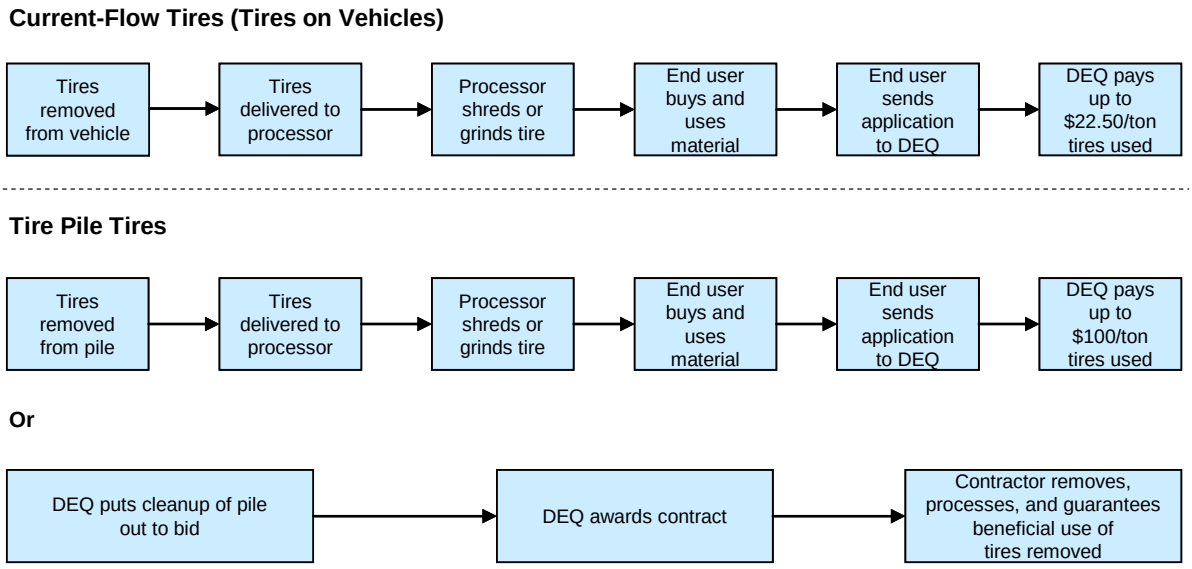
State Investment in Developing Markets Resulted in Successful Waste Tire Management Program

In 1989, Virginia enacted a program to address improper disposal by creating a market for recycling tires. Without such market assistance, it is questionable whether the State would have collected the 23 million tire pile tires it has since 1994. The department estimates that it will complete the cleanup of the 2.4 million remaining abandoned tires in piles by the end of 2013.

Program Success Resulted From Dedicated and Stable Funding for Market Development. Recognizing the tangible health and environmental threat posed by abandoned waste tires, the 1989 General Assembly enacted the Waste Tire Trust Fund and Waste Tire Management program. Tire retailers were required to charge customers a fee of 50 cents for every new tire purchased. Monies from the fee are directed to the State's Waste Tire Trust Fund, a dedicated and non-reverting fund. Between 1989 and 1996, DEQ used the fund to implement 16 regional programs, covering most of Virginia's localities, which helped regions develop and offer waste tire management services. DEQ funded each program for two years, and most regions have continued the programs after DEQ funding ended.

Beginning in 1994, DEQ directed waste tire funds to end-user reimbursements. Currently, DEQ pays waste tire end users up to $22.50 per ton of current-flow tires (tires on vehicles) managed, and up to $100 per ton of tire pile tires managed as authorized by the *Code of Virginia*. After tires are collected, processed and utilized by an end user, the end user sends an application to DEQ detailing the quantity of current flow and tire pile tire material utilized, as shown in Figure 11. This end-user reimbursement compo-

Figure 11: Waste Tire Management Program



Source: Information provided by DEQ.

nent of the program ensures that processors continue to demand used tires by guaranteeing them at least the reimbursement payment for processing tires. DEQ reimbursed end users approximately $2 million for managing over 90,000 tons of current-flow tires in FY 2007.

DEQ staff have reported that the reimbursements for tire pile tires do not appear large enough to induce the market into cleaning up all the tire piles located in the State. DEQ continues to manage some tire pile tires through end-user reimbursements, but that number is declining, as Table 9 shows, because the tire piles remaining are difficult to manage due to their size and the terrains in which the piles are located.

Table 9: Number of Tires in Piles Managed Through End-User Reimbursement Is Declining

Fiscal Year	Tires Managed (Tons)	Cost
2005	9,787	$910,667
2006	955	$95,550
2007	608	$60,800

Source: Data provided by DEQ.

The fee was increased to $1.00 per new tire by the 2003 General Assembly in response to rising clean-up costs and an enormous fire involving three to five million tires in Roanoke County. The General Assembly directed DEQ to use all additional funds generated

by the fee increase for tire pile cleanup projects. DEQ has been using these additional revenues to put unabated tire pile projects out to bid, generally paying a higher rate for these clean-up projects than the end-user reimbursement rates, as shown in Table 10. Between 2003 and 2007, DEQ removed almost seven million tires from tire piles at a cost of approximately $12 million. The 50 cent increase was set to expire in 2008. However, the 2008 General Assembly delayed the expiration until 2011 to allow DEQ to complete the cleanup of all currently existing tire piles.

Table 10: Some Tire Pile Clean-Up Projects Cost More Than the $100 Per Ton End-User Reimbursement Rate

Year	Tires Removed	Tons Tires Removed[a]	Project Cost	Cost per Ton[b]
2003	1,657,000	16,570	$1,349,525	**$81.44**
2004	369,000	3,690	$369,128	**$100.03**
2005	4,149,200	41,492	$8,896,711	**$214.42**
2006	344,600	3,446	$881,755	**$255.88**
2007	290,500	2,905	$431,358	**$148.49**

[a] Estimate based on 20 pounds per tire, and 2000 pounds per ton.
[b] Estimate based on tires removed tonnage estimate.

Source: JLARC staff analysis of data provided by DEQ.

Program Made Consistent, Measurable Progress Towards Eliminating Tire Piles. Between 1993 and 2003, DEQ utilized end-user reimbursements, demonstration projects, regional projects, and owner cleanups to eliminate 698 tire piles, which contained more than 16.6 million tires. DEQ spent almost $9 million to accomplish the cleanup. Between 2003 and 2007, DEQ used monies from the 50 cent fee increase to hire contractors to clean up the State's most difficult piles. This initiative eliminated another 6.8 million tires at a cost of almost $12 million.

DEQ estimates that 161 tire piles containing 2.4 million tires remain in the State. The department projects that the fee increase extension will allow it to eliminate these remaining tire piles by the end of 2013.

There Appears to Be a Continuing Need for the Program. In 2011, Virginia's tire fee will revert to 50 cents per new tire sold at retail raising concerns about the continuing need for a waste tire management program. DEQ staff indicate that the tire end users, tire retailers, and processors have expressed concerns in the past that the waste tire management infrastructure would collapse without the State's end-user reimbursements. Such concern may have merit in view of the fact that Virginia lacked a waste tire management infrastructure prior to the introduction of the State program. Additionally, waste tires have little value even when prop-

erly managed. For example, proper uses for tire material such as landfill daily cover, landfill drainage media, or septic drainfields are more costly than simply dumping the whole tire in a pile or landfill. As a result, without State assistance, it is possible that waste tires will once again end up in piles causing health and environmental hazards.

Lead-Acid Battery

A type of rechargeable battery with a wet cell, such as those used in automobiles, golf carts, and motorcycles.

Few Used Lead-Acid Batteries Are Improperly Disposed Because Paying Markets Exist

Some of the heavy metals in lead-acid batteries that can present environmental hazards are nonetheless valuable materials that can be used to produce new batteries. It appears that the State's efforts, as well as the development of markets for the valuable materials they contain, have resulted in successfully limiting the improper disposal of such batteries. Nonetheless, data limitations prevent a before-and-after comparison of improper disposal rates. In addition, DEQ may not be fully implementing the program as required by statute.

Virginia Established a Program for Managing Lead-Acid Batteries. The 1990 General Assembly enacted legislation to encourage the proper disposal of used lead-acid batteries. The *Code of Virginia* places the burden of implementing this program on lead-acid battery retailers and wholesalers. The first component of the program is a landfill ban prohibiting the disposal of any lead-acid battery in a landfill or with mixed municipal waste. The second component of the program is a collection requirement; every lead-acid battery retailer and wholesaler is required to accept a used lead-acid battery in exchange for the purchase of a new lead-acid battery. Third, within 90 days of accepting a battery, the collector is required to deliver the battery to a secondary lead smelter or recycler. Failure to collect used batteries in exchange for new batteries or to deliver batteries to a recycler or smelter within 90 days can result in a fine of up to $50 per battery.

Lead-Acid Batteries Reportedly Have a 90 Percent Recycling Rate Nationwide. Despite the lack of an extensive regulatory structure for lead-acid battery recycling, EPA and the Battery Council International report a 90 percent recycling rate for lead-acid batteries nationwide. DEQ could not quantify the percentage of batteries recycled in Virginia, because data is not collected on the number of batteries sold. However, as part of their annual recycling rate reporting, solid waste planning units can include the weight of heavy equipment and automobile batteries in their recyclable materials total. Using the total weight reported in 2007 as an approximation, about 716,000 batteries were recycled that year. DEQ staff indicated their belief that Virginia's recycling rate is similar to the national rate due to the valuable nature of a battery's components.

For example, many battery retailers provide a discount on new lead-acid batteries if the customer returns a battery. These retailers can then sell the battery to a smelter, who pays approximately $7 to $8 per battery, according to DEQ staff.

DEQ May Not Be Implementing This Program as Required by Statute. The only responsibility the *Code of Virginia* places on DEQ is to "produce, print, and distribute" signs to lead-acid battery retailers. Statute does not stipulate how often DEQ must perform this task. According to DEQ staff, these signs were last printed by the Department of Waste Management when the law first went into effect in 1990, and DEQ has not printed or distributed signs since then. The *Code of Virginia* also gives DEQ the authority to inspect facilities to ensure compliance with the law, but it appears that DEQ only performs such inspections in the context of other hazardous waste inspections. Furthermore, DEQ staff indicate that the fine for not complying with the law has never been imposed.

The extent to which the recycling rate for these batteries would be improved if DEQ began distributing such signs on a regular basis and ensuring that the signs were properly displayed is difficult to determine. JLARC staff were told that the department allocates little time to the program due to its self-implementing nature. Nonetheless, it appears recycling rates are high.

Outcomes of Used Motor Oil, Oil Filters, and Auto Fluids Management Program Are Unclear

Assessing both the scope of the problem of improperly disposed used motor oil, filters, and auto fluids, and the effectiveness of the management program prove difficult due to the unavailability of data regarding amounts produced, used, or disposed. However, the management program that DEQ currently implements may not meet all the requirements of the *Code of Virginia* because of the lack of resources dedicated to the program. Due to the lack of data regarding these materials, evidence does not exist indicating that states which dedicate more resources to their used motor oil, filter, and auto fluids programs more effectively ensure the proper disposal of these materials.

Scope of Improperly Disposed Used Motor Oil Problem Is Unclear. Quantifying the extent of the problem of improperly disposed used motor oil requires making tenuous assumptions about individuals' behavior. At least three different studies in the past ten years have estimated that between 3.3 million and 9.5 million gallons of oil are improperly disposed of in Virginia annually (Appendix I).

While estimates of the amount of used motor oil improperly disposed vary considerably, most sources indicate that this amount is likely declining. Although it does not provide a quantitative estimate, a July 2006 U.S. Department of Energy report indicates that the number of "do-it-yourself" (DIY) oil changers has declined since 1996. DEQ staff similarly reported their belief that since the introduction of the program in 1989, the number of DIY oil changers has declined. In both cases, they attribute the decline to the increasing popularity of "do-it-for-me" oil change centers or auto care centers. Most sources agree that DIY oil changers are responsible for the majority of improperly disposed used motor oil. As a result, a decline in the number of DIY oil changers would likely lead to a decline in the amount of improperly disposed used oil.

State Has Dedicated Few Resources to Used Motor Oil, Oil Filters, and Auto Fluids Management. While statute requires DEQ to operate a used motor oil, oil filters, and auto fluids management program, funds have never been dedicated to the program. As a result, DEQ staff indicate that they likely dedicate less than 40 hours per year to the program. However, the State has dedicated resources to other used motor oil, filter, and auto fluids management efforts. First, there is a tax credit provided to any business in the Commonwealth that accepts waste oil from the public. The credit is equal to 50 percent of the purchase price of machinery that burns waste oil and can only be used in the year in which the machinery was purchased. Second, the General Assembly appropriated $50,000 in FY 1998-1999 to allow DEQ to conduct a study of alternatives for developing its program. However, the State does not appear to have implemented any of the options presented in this 1999 report.

DEQ's Current Implementation Plan for the Program Appears to Meet Statutory Requirements at a Minimal Level. The *Code of Virginia* sets out six components for the used motor oil, oil filters, and auto fluids program. DEQ appears to have at least partially implemented most of the elements of this program (Table 11).

Program's Effectiveness Is Unknown. The objective of this program is to prevent the improper management of substances—used motor oil, oil filters, and auto fluids—that may negatively affect human health and the environment. However, neither DEQ nor the General Assembly has set any measurable targets or goals for the program. Although no direct measures or estimates of used oil generation and disposal exist, other measures may indicate whether the program DEQ currently employs is meeting its broad objective of preventing the improper disposal.

DEQ's annual recycling rate report may provide the most direct assessment of the amount of used motor oil recycled in the State,

Table 11: Level of Implementation by DEQ of the Used Motor Oil, Oil Filters, and Auto Fluids Management Program

Program Component	Level of Implementation	Explanation
Statewide education program	◑	DEQ provides a website with the statutorily required information, but does not implement any proactive outreach efforts.
Online database of collection centers	◑	DEQ's website hosts a database of sites collecting used motor oil, filters, and antifreeze, but this website is only updated when DEQ receives a call or email. DEQ does not regularly re-survey the potential collection sites. Additionally, the database contains no specific collection sites for other auto fluids, as required by 2008 amendments to statute.
Outreach to collection centers	○	DEQ's website does not contain any information for current or potential collection site operators, and DEQ does not provide other outreach programs.
Toll-free hotline	●	DEQ's toll-free hotline provides callers the option to receive information about how and where to recycle their used oil, filters, and auto fluids.
Provision of signs to retailers	◑	DEQ has not provided signs to retailers since the program first went into effect. DEQ has recently made sign templates available via its website, which retailers can then print.
Requirement for retailers to post signs	?	Retailers' compliance with the requirement to post signs encouraging customers to recycle these materials is unknown.

● Fully Implemented ◑ Partially Implemented ○ Not Implemented ? Level of Implementation Unknown

Source: JLARC staff analysis.

but the reliability of this data is questionable. In the 2006 annual recycling rate report, DEQ reported that 13.9 million gallons of used motor oil were recycled in Virginia. However, drawing conclusions from this data is difficult because it may not capture all oil that is recycled in the State. As will be discussed in Chapter 7, data collection efforts vary among the 74 SWPUs. As a result, motor oil that is recycled may not be accounted for. In addition, DEQ's dataset does not capture the total amount of used motor oil disposed, which prevents the calculation of a recycling rate for used motor oil.

Other DEQ data sources may provide two indirect methods of measuring the program's effectiveness. DEQ water monitoring may provide a method to determine whether improper used oil disposal is a problem since the EPA reports that the oil from one oil change can contaminate up to one million gallons of fresh water. However, according to DEQ staff in the Water Division, any small volume of oil dumped by an individual would become too diluted for monitors to detect. DEQ staff indicate that at least a barrel of oil would need to be dumped for detection by the monitors.

The number of complaint calls DEQ's Pollution Response (PREP) hotline receives regarding suspected used oil dumping may provide another indirect method to assess the program's effectiveness. DEQ has received few complaints regarding suspected used oil dumping to the PREP hotline. Between 2003 and 2007, less than three percent of all calls to the PREP hotline were about suspected oil dumping. The annual number of calls for used oil appears to have been relatively constant between 2003 and 2007.

There Is a Lack of Conclusive Evidence That More Robust Programs Result in Reduced Levels of Improper Management. A 2006 report of the U.S. Department of Energy on used oil re-refining noted:

> Many states have developed proactive local programs for dealing with used oil management, but there is little consistency from state to state. Some states promote curbside pickup of used oils from DIY oil changers while others classify used oils as hazardous waste and tax lube oil sales to fund collection programs. Some fund recycling initiatives from state treasuries and others require retail gas stations to accept DIY used oils.

Other states contacted for this review operate used motor oil programs that vary in their scope (Table 12). Other states that appear to operate more robust programs than Virginia's generally fund these programs.

The 2006 U.S. Department of Energy report also indicated that proactive statewide programs for used oil management "appear to be effective." There is, however, a lack of conclusive evidence indicating that states with more proactive programs have reduced the level of improper used oil disposal compared to states with less proactive programs. For example, both Maryland and South Carolina operate more robust used motor oil management programs than Virginia's program. These programs fund collection tanks for local government buildings and fund collection service for these tanks. Both states impose a fee on oil brought into the states, which funds the programs. While both states collect data on the amount of oil collected through the programs, staff with both states note that the data cannot be used to draw any conclusions about the percentage of oil which is improperly disposed in the states. This is because the total amount of used oil being disposed and the total amount that is recycled in the states is not known.

Table 12: Used Motor Oil Management Programs in Selected States

Program Element	Virginia	Maryland	North Carolina	Tennessee	Kentucky	West Virginia	South Carolina	Pennsylvania
Public education (brochures, website, etc.)	✓	✓	✓	✓			✓	✓
Collection center database	✓	✓		✓	✓	✓	✓	✓
Toll-free number / hotline	✓	✓		✓			✓	✓
Outreach / technical assistance to collection centers	✓	✓	✓	✓		✓	✓	✓
Retailers required to post signs	✓	✓					✓	
Collection tanks provided		✓					✓	
Collection tank pick-up provided		✓					✓	
Grants for purchase of collection tanks				✓				
Fee imposed on oil to fund program		✓		✓			✓	

Source: JLARC staff analysis of information provided through phone interviews with staff in other states.

Chapter 6

Compliance of State Agencies and Universities With Recycling Requirements

In Summary

The *Code of Virginia* requires each university and each agency, including the General Assembly, to recycle and to implement procedures to reduce the amount of waste it generates. The statute also specifies particular materials which must, at a minimum, be recycled. However, State-level policies, procedures, and resources which further established the basic elements of a State entity recycling program in its early years were eliminated during DEQ's reorganization in the mid-1990s, and have been lacking since then.

Most respondents to a JLARC staff survey of State entities indicate that their organizations have a recycling program in place. On average, respondents to the survey reported recycling about one-third of the waste they generated in FY 2007. However, 39 percent of the respondents indicated that a program has been implemented to minimize the agency's production or output of solid waste. The cost of operating a recycling program presents a challenge for State entities. Assistance with costs, public education, and planning were identified as ways to potentially improve program success and the State's long-term waste reduction efforts.

When the General Assembly enacted mandatory recycling for localities that was to become effective in 1991, the legislature also recommended that State agencies also be required to recycle in an effort to have the State assume its share of reducing the volume of waste to be disposed. The following year, State agency recycling was required.

FEW POLICIES OR RESOURCES CURRENTLY EXIST TO GUIDE STATE ENTITY RECYCLING PROGRAMS

Each State university as well as each executive and legislative branch agency in Virginia has been required to have a recycling program in place since 1991. Guidelines establishing basic program elements and certain requirements were subsequently developed to assist such entities with developing and implementing their programs. The Department of Waste Management (DWM), and subsequently DEQ, devoted resources to assist with implementation of the elements and to ensure the requirements were being met. In the early years of the program, DWM and later DEQ had more positions dedicated to assisting State agencies and local planning units. The departments used these positions to provide educational materials and training to agencies and planning units, hold recycling conferences, and review data provided as part of the recycling rate reports.

These guidelines and resources were in place until 1995, when they were eliminated as the result of DEQ's reorganization. Since that time, few efforts have been made to coordinate State entity recycling efforts. Currently, no guidance similar to what DWM established in 1991 has been prepared. While a full-time position was created at the Department of General Services (DGS) to coordinate State agency recycling and procurement activities, this position has not performed the same level of State coordination as DEQ staff did, and recently the responsibilities have primarily focused on procurement policy. DGS and DEQ provide assistance to State agencies, but only on a case-by-case basis.

Guidelines Established in 1991 Required Planning and Reporting

Section 10.1-1425.6 of the *Code of Virginia* requires "each State university and state agency of the Commonwealth, including the General Assembly," to establish programs for collecting and using recyclable materials. The *Code of Virginia* also identifies the minimum five materials that State entities had to address: aluminum, corrugated paper (cardboard), glass, office paper, and used motor oil. According to statutory language, State entities are to carry out these efforts by implementing procedures for

- collection and storage of recyclable materials they generate;
- disposal of such material to vendors; and
- reduction in the amount of waste generated.

At the time of enactment, such procedures were supposed to be in accordance with programs and plans developed by DWM. The department issued such plans in a 1991 document, *State Agency Planning Guidelines for the Collection and Marketing of Recyclable Materials*. The document established three requirements for State agencies regarding recycling:

- develop procedures for collection and storage;
- prepare a recycling collection plan; and
- submit an annual report detailing collection amounts and programs.

The document detailed how agencies were to organize, conduct, and report on their recycling activities, including information on identifying which materials to collect, markets, educating employees, and program evaluation. Each agency was required to develop a recycling plan similar to what the solid waste planning units (SWPUs) were required to develop. Such plans and the accompanying reports were reviewed by DWM staff. In addition, DWM's guidelines identified resources it had available to assist the agen-

cies, such as four staff specialists to help with recycling efforts at the State and local levels, an information phone line, and public education materials. The statute did not set minimum recycling rate requirements for State agencies as it did for localities.

No Guidelines Currently Exist for State Entity Recycling

The State entity guidelines remained in place until 1995 when DEQ reorganized many of its responsibilities. According to DEQ staff, the reorganization resulted in the elimination of all 14 positions with at least some litter prevention and recycling responsibilities, as well as the elimination of all funding for the activities. Without any positions available to ensure compliance, the guidelines appear to have fallen out of use and State agency reporting has ceased. Very little oversight of the statutory recycling requirements for State entities has occurred since. According to DEQ and DGS staff, they do respond to specific questions if contacted by a State entity seeking assistance. However, the amount of interaction being provided currently is substantially less than what was provided prior to 1995.

A limited effort has been made to revive oversight and assistance for State agency recycling. A 1997 legislative study into ways to increase the State purchase of recycled products recommended collecting and reporting on the "volume of products being recycled" by State agencies and the use of purchased recycled material. The 1998 Appropriation Act provided a position within DGS to "coordinate state agency recycling and procurement efforts…as recommended by" the aforementioned legislative study. No corresponding appropriation was provided, however. Responsibilities assigned to the position by the act included

- establishing guidelines;
- standardizing record-keeping; and
- product promotion.

While these requirements appear somewhat similar to those established by the *Code of Virginia* for DWM, DGS has recently adopted a more narrow view of the language. According to DGS staff, the responsibilities of the position focus on establishing recycling opportunities for State entities through DGS's procurement and surplus property functions, not developing recycling and waste reduction policies for all of the Commonwealth's agencies and universities. The position created at DGS has not had the resources or priority to carry out State recycling efforts to the extent DEQ did in the early 1990s.

The General Assembly may wish to consider whether the current level of recycling occurring at Virginia's State universities and agencies is sufficient to meet the recycling or waste reduction goals of the Commonwealth. Some level of recycling is clearly required by the *Code of Virginia*, but guidance may need to be developed indicating the extent to which it should occur and establishing the basic program elements. Prior to developing such guidance and in order to obtain a more accurate understanding of recycling efforts being conducted, policymakers may want to require a more detailed audit of State entity programs, including the amounts of waste and recyclables being generated by type of material.

STATE ENTITY SURVEY RESPONDENTS REPORT IMPLEMENTING SOME RECYCLING ACTIVITIES

JLARC staff surveyed 140 executive branch agencies, legislative branch agencies, and institutions of higher education about their recycling and waste reduction activities and received 86 responses (a 61.4 percent response rate). (See Appendix B for more information about the survey results and the number of responses by type of entity.) Virtually all respondents appear to be performing some level of recycling. A limited number of responses providing tonnage for both waste generation and recycling indicate an approximate recycling rate of 31 percent. About 60 percent of respondents indicated their entity has implemented a source reduction program to reduce the amount of waste it generates.

Recycling Opportunities Are Available at State Entities

According to survey respondents, recycling opportunities are available to State employees and staff and students at the State's higher education institutions. For example, 79 respondents indicated they had collection containers for at least some recyclables in their facilities. Forty-three respondents indicated that their entity encouraged recycling or source reduction through promotional or educational campaigns. In addition, 61 of 84 respondents (73 percent) indicated that 100 percent of their employees had access on a regular basis to the recycling opportunities provided by the organization.

JLARC staff also asked State entities to rate the priority level given to their solid waste reduction programs. Fifty-seven of the 84 respondents (68 percent) indicated some priority was being given to their programs, but that more could be done. Twenty-one (25 percent) indicated that their programs had received a high level of priority and that it was not likely that they could do more. Only six respondents reported little or no priority was given to their programs.

State entities were also asked to rate the effectiveness of their solid waste programs. Forty-seven (56 percent) reported that they thought the effectiveness of their programs was excellent or good. Another 33 indicated that they thought their programs were fairly effective.

Limited Data Suggest State Entity Recycling Rate of 31 Percent in FY 2007

JLARC staff received 24 responses providing estimated recyclable and waste generated tonnage in FY 2007. Based on those 24 responses, approximately 45,000 tons of MSW was generated. This figure amounts to less than one percent of the total 15.8 million tons of MSW received at Virginia's permitted waste management facilities in that same year. The same 24 respondents indicated that their entities recycled about 14,000 tons of material. Based on the reported figures, a recycling rate of 31.3 percent can be estimated for the State's universities and agencies. However, without more accurate MSW generation and recycling tonnage, the accuracy of the estimate is not known.

Because the survey data is so limited, it may be useful to look at the amounts reported by DGS on the survey. DGS administers the waste and recyclable collection contracts for more than 70 State and legislative agencies located in Capitol Square. The department reported that in 2007, 734 tons of waste were collected from these entities. During the same year, 159 tons of recyclables were collected. Based on this information, the entities served by DGS' waste and recycling contracts recycled 21.7 percent of their waste. Most of the recyclables being collected from the Capitol Square entities are paper products, which are not as heavy as metals or plastics produced by commercial or manufacturing industries. The cost of the contract to collect the material was slightly more than $28,000. In January 2008, DGS launched an expanded recycling collection effort for agencies located within Capitol Square. The program will increase the amount of material being collected to include mixed paper, aluminum, and plastic.

Responses Indicate Opportunities to Increase Aluminum, Paper, and Cardboard Recycling

The statutory language mandating the establishment of State university and agency recycling programs specifies that, at a minimum, paper, corrugated paper (cardboard), aluminum, glass, and motor oil should be collected. Respondents indicated that their programs collect varying levels of these materials. As Table 13 illustrates, 25 respondents reported collecting all or most of the office paper they generated during the period of April, May, and

Table 13: Respondents Indicate That Materials Required to be Recycled Are Collected at Varying Levels

Material	All / Most	Some / Little	Not Collected	Not Generated[a]
Office Paper	25	20	2	0
Cardboard	17	14	10	6
Aluminum	15	13	4	15
Motor Oil	12	4	3	28
Glass	3	9	13	22

Note: A total of 47 responses for each question was received.
[a] Respondent indicated that this material was not included in its waste stream.

Source: JLARC staff survey of State entities, summer 2008.

June 2008, but almost as many (20 respondents) reported collecting some or no paper. Less than half (17 respondents) indicated that they were collecting all or most of the cardboard they generated. The 13 respondents indicating glass is not collected is probably reflective of the difficulty in finding markets for the material.

It appears that State entities could improve their collection efforts for materials for which markets are strong, particularly aluminum, paper, and cardboard. Markets for aluminum were rated excellent to fair by a majority of respondents to the JLARC staff survey of local recycling programs. However, 17 of 32 respondents indicated that they were collecting only some to none of their aluminum waste. Because the price for aluminum is likely to help offset the cost of collection to a greater extent than other materials, increased collection efforts should not be cost-prohibitive. Recycling aluminum also produces substantial energy savings according to EPA. The aluminum can recycling process saves 95 percent of the energy needed to produce aluminum from bauxite ore, as well as natural resources. Additionally, 24 respondents indicated their entity was collecting only some to none of generated cardboard and 22 respondents indicated only some to none of generated office paper waste was being collected. According to the JLARC staff survey of SWPUs, more than eight in ten respondents indicated that markets for cardboard and paper were excellent or fair.

Costs and Staffing Levels Vary at State Entities

Costs associated with collecting recyclables vary considerably. Survey respondents reported spending a total of approximately $1.7 million in FY 2007 on recycling and source reduction programs. Based on the reported information, respondents indicated that the median total expenditure for their recycling programs was

about $1,600 in FY 2007. Additionally, survey responses identified $580,000 in savings from avoided landfill costs in FY 2007.

Some entities spent substantially more than the average. For example, the University of Virginia (UVA) reported spending about $270,000 while collecting about 3,900 tons of material—roughly 39 percent of their total waste output. UVA's program is considered to be fairly robust in terms of providing recycling opportunities. For example, anyone residing in on-campus housing is provided a two-sided collection container for white paper and mixed paper. Larger collection containers located throughout the residential facilities make it convenient to dispose of these materials. Separating these materials also makes their resale value higher.

Responses to the survey indicate an average of one to two full-time positions assigned to recycling programs at State entities. Most entities responding to the survey indicated having less than one full-time person responsible for overseeing their recycling activities. The number of positions dedicated to recycling ranged from less than ten percent of one position's time to 15 positions at the University of Virginia. When asked about how materials are collected, 33 survey respondents indicated they collect their own recyclables but another entity handles the disposal. Another 26 respondents indicated DGS handles their collection efforts. These factors may help explain the low number of staff associated with the reported programs.

Sixty Percent of State Entities Have Not Implemented Source Reduction Efforts

In addition to diverting waste from disposal through recycling efforts, State entities are also tasked by statute with reducing their overall generation of waste. One way to accomplish this is through source reduction programs. However, only 33 respondents (39 percent) indicated implementing a solid waste reduction or pollution prevention program addressing solid waste. On average, respondents attributed 46 percent of the reduction in their solid waste generated to their source reduction or pollution prevention programs. Respondents reported the greatest success in reducing their generation of paper and cardboard waste as a result of their source reduction programs. Nineteen respondents indicated reduction levels of 50 to 100 percent for cardboard and 16 indicated similar percentage reductions for paper. Conversely, source reduction productions targeting plastic bags, textiles, and glass had the least success.

SURVEY RESPONDENTS INDICATE PROGRAM COSTS MAKE RECYCLING DIFFICULT

Respondents to the JLARC staff survey reported there are challenges associated with the cost of operating their programs. Respondents also reported program improvements could be achieved through assistance with these costs, particularly assistance with identifying and developing markets.

Cost Issues Challenge State Entity Recycling Programs

It would appear that the costs associated with operating a recycling program are a primary challenge faced by respondents to the JLARC staff survey. When asked to identify the challenges faced by their programs, storage space, cost, and markets were chosen most often (Table 14). Storage can be an issue in two ways. First, there are the physical limitations facilities face—where to place collection bins and where to house the collected material until it can be sent to a market can be challenging. Second, storage also has a financial component. Purchasing or renting collection containers to handle a large agency's material can be costly. Forty-three of the 84 respondents (51 percent) to the survey indicated storage was a challenge. This was especially true for the community colleges that responded. All seven of the community college respondents identified storage as an issue. Twenty-five of the 50 State agency respondents (50 percent) also identified storage as an issue.

Table 14: State Entities Most Often Cite Factors Related to Costs as Challenges (2008)

Challenge	State Agency	Legislative Agency	Institution of Higher Education	Total
Place to store recyclables	25	5	13	43
Cost of collection and disposal	21	0	17	38
Limited or no access to markets	17	1	9	27

Source: JLARC staff survey of State entities, summer 2008.

More directly, financial factors may impact the success of recycling efforts through the actual cost of collecting and disposing of the material as well as the viability of markets. Thirty-eight of the 84 survey respondents (45 percent) reported the cost of collecting and disposing of their materials as a barrier to program success (Table 14). Seventeen of the 21 higher education responses and 21 of the 50 State agencies identified the cost of administering their programs as a challenge. (None of the 13 legislative agencies who responded indicated cost as a challenge, potentially because their

programs are served by DGS for the most part.) Comments to the survey about cost issues tended to focus on the fact that while State entities are required to recycle, there is no direct funding for it. According to one respondent, "Recycling is only one of many state mandates that have come … without funding." Another reported that "agencies are so overloaded with mandates that there are few resources to address them all in an equal effort."

The financial impact of recycling on State agencies is also found in the availability of markets, which 27 of the 84 survey responses cited as a challenge (Table 14). As discussed in Chapter 3, costs and markets are closely related. Where viable markets exist, an entity can generate revenues to offset the collection and disposal costs associated with their program. Monies can also be saved through avoided landfill costs. Table 14 identifies the number of State entities that identified markets as an issue. The fact that markets for recyclables are strong now may help explain why fewer than a third of respondents identified this issue as a challenge. Nonetheless, markets were identified as a challenge or barrier as the third most often choice.

Assistance With Public Education and Program Costs Cited as Way to Improve State's Recycling Effort

When asked to identify ways the State could improve its long-term recycling efforts, State entities responded that help with public education and outreach and addressing their program costs could lead to improvements. Respondents also identified a need for assistance with markets. Forty-seven respondents identified a need for an increased State role in public education and outreach efforts (Table 15). As was discussed previously, the State at one time provided greater assistance to State entities in operating their programs. Educational resources were available and could be provided to State entities upon request. The literature on recycling consistently identifies public education and outreach as important components of any successful program. Communication about what and when to recycle can positively impact participation rates and increase the volume of material being recycled, thus improving the supply of materials for existing and potential markets.

As discussed in the previous section, robust markets for recyclables help to offset collection and disposal costs, and 25 respondents identified a lack of markets as a barrier to the success of their programs. Forty-five respondents indicated that increasing the State's role in finding existing markets would help improve the State's long term solid waste reduction goals (Table 15). Forty-three re spondents identified State assistance with developing markets would prove beneficial.

Table 15: State Entity Survey Respondents Suggest Programs Could Be Improved Through Assistance With Outreach, Costs, and Planning

Suggested Improvement	State Agency	Legislative Agency	Institution of Higher Education	Total
State assistance in public education and outreach	26	8	13	47
State assistance in finding markets	26	4	15	45
State assistance in developing markets	22	3	18	43
Increased State funding for local recycling program	16	2	17	35
Improved statewide planning for best practices and State entity goals	16	3	7	26

Source: JLARC staff survey of State entities, summer 2008.

In addition, almost one-third of State entity respondents suggested improving statewide planning to focus on identifying best practices and defining goals. One respondent suggested this could be done by increasing DEQ's outreach to State entities to assist in planning, identify and disseminate best practices and coordinate future waste reduction activities.

Chapter 7

Determining the Statewide Recycling Rate

In Summary

Virginia requires solid waste planning units (SWPUs) to annually report the amount of waste disposed and recycled, and the State has implemented a formula to measure the percentage of recycling occurring. However, the reported recycling rate may not accurately capture the amount of recycling occurring in the Commonwealth. Variation in local data collection methods may result in fewer materials being reported than are actually recycled. At the same time, some confusion apparently exists regarding how to complete the recycling rate reports. DEQ offers training sessions to address reporting questions, but few SWPUs participate. Additionally, the department appears to lack the resources to perform a detailed evaluation of the reported data. DEQ should institute a more formal evaluation process to help identify why some localities perform substantially above or below the norm.

Currently, many states, including Virginia, report the amounts of municipal solid waste (MSW) recycled in their jurisdictions, and EPA reports a national MSW recycling rate. In order to provide such a figure, the federal and state governments have developed methods for collecting, analyzing, and reporting recycling data. Since 1991, Virginia localities have had to achieve a minimum recycling rate and report on their efforts towards that goal.

Different ways to measure a statewide recycling rate exist. The mandate for this study notes that "only 6.1 percent of the waste delivered to permitted landfill facilities is subsequently diverted from disposal or mulching." DEQ's solid waste management reports note, however, that most material is recycled at non-permitted facilities and that the majority of recycling information is not reported to the department through such reports. By contrast, SWPUs may collect data for all waste disposal and recycling that occurs within their jurisdiction and report such data to DEQ. In 2007, SWPUs reported collecting 2.9 million tons of recyclables which amounts to about 33 percent of the MSW they reported generated that year. However, DEQ cautions against making any comparisons between such information and the information reported by the permitted facilities.

EPA HAS DEVELOPED GUIDANCE FOR CALCULATING A STANDARD RECYCLING RATE

In 1997, EPA released a guidance document to assist states and localities with calculating their recycling rates. The measure developed by EPA relies on its definition of MSW. The EPA document explains that MSW was chosen because it is widely accepted and understood and the data are accessible; materials such as construction and demolition debris and manufacturing and industrial wastes are not included in EPA's definition. The EPA calculation methodology measures a MSW recycling rate as the percentage of total MSW recycled divided by total MSW generated. MSW generated is the sum of MSW recycled and MSW disposed of.

THERE ARE INCONSISTENCIES IN VIRGINIA'S REPORTED RECYCLING RATE INFORMATION

Recycling by localities is considered a critical element of Virginia's solid waste management program. In fact, the department refers to recycling and the development of solid waste management plans as having "the most significant impact on diverting waste from landfills." The *Code of Virginia* establishes mandatory recycling rate minimums for all solid waste planning units. SWPUs are required to report the percentage of municipal solid waste recycled in their jurisdiction on an annual basis.

A key component of a successful recycling program is to have accurate and comprehensive data collection. Differences in the sources used to collect data at the local level suggest that there may be issues with the accuracy and comprehensiveness of the local recycling rates. Localities may not be taking advantage of training opportunities available from DEQ that could assist them with data collection. At the same time, while resources limit the department's ability to ensure data accuracy, transitioning to an electronic data reporting system may be beneficial.

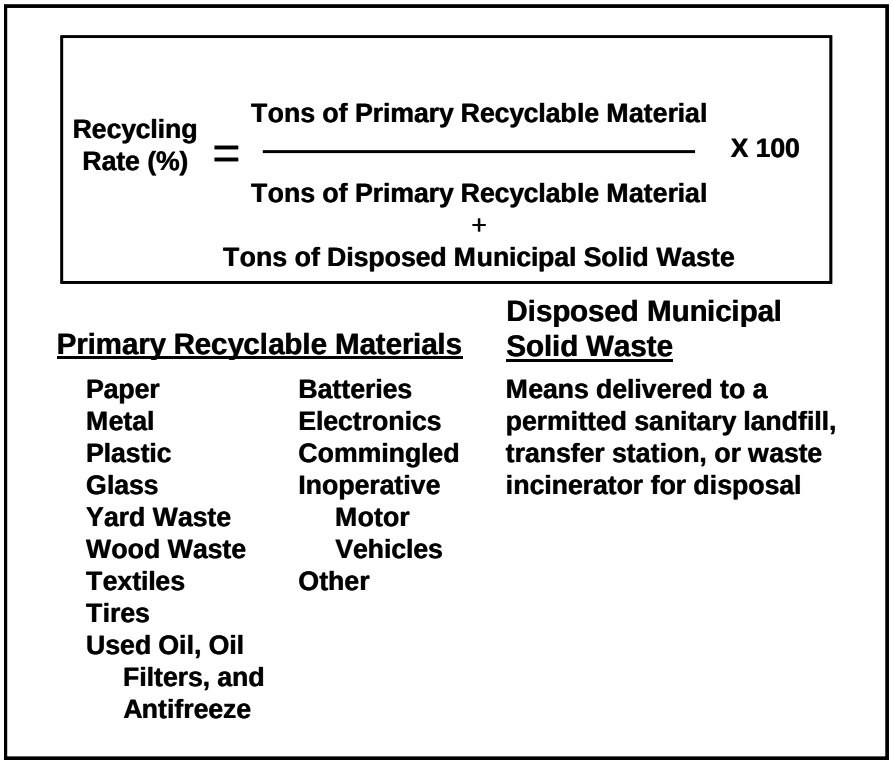
Solid Waste Planning Units Report Recycling Information to DEQ

Statute provides little guidance beyond setting the mandatory recycling rates. For example, there is no guidance concerning how the SWPUs are to achieve their mandated rates. Nor does statutory language identify how such rates are to be calculated.

Virginia's solid waste planning and recycling regulations establish what the recycling rate is to measure and how such rates are to be calculated. According to DEQ staff, recycling rates measure the proportion of MSW diverted from disposal for recycling activities. SWPUs calculate a base recycling rate by dividing the tonnage of acceptable recycled materials (as defined by regulation), by the

sum of such recycled materials and the tonnage of MSW disposed of within the jurisdiction (Figure 12). Finally, the proportion is multiplied by 100 to obtain a percentage.

Figure 12: Recycling Rate Formula



Source: 9 *Virginia Administrative Code* 20-130-125(B) and DEQ, *Commonwealth of Virginia Locality Recycling Rate Report for Calendar Year 2007*, (DEQ Form 50-30 Revised).

Planning units are permitted to add credits to their base recycling rate. However, such credits cannot exceed five percent of the reported base recycling rate. Credits are permitted for the following:

- recycling non-MSW;
- reusing any solid waste;
- landfilling recycling residue; and
- implementing a source reduction program.

Staff at the SWPUs collect the information, prepare the recycling rate report, and submit the report to DEQ for review. Planning units obtain their recycling rate information in different ways, including

- collecting weight or volume data from landfills, materials recovery facilities, and transfer stations;

- using weight or volume data from their own solid waste and recycling haulers' bills; and
- surveying businesses, institutions, or recycling processors.

Once collected by the SWPU, the recycling and disposal information is manually entered onto DEQ's paper reporting form and submitted to the department. All recycling rate reports must be submitted to DEQ by April 30 of each year. SWPUs can request extensions in order to amend their reports.

DEQ begins its review by entering the data submitted on the form into a spreadsheet that also contains the previous year's data. According to department staff, current and preceding year data are compared to determine if any changes in the reported tonnage of materials have occurred from one year to the next. Staff are also evaluating the reported data for potential "red flags." According to DEQ staff, such red flags might include reported tonnage that appears incorrect based on the planning unit's listed population or reported paper tonnage being greater than reported metals tonnage (usually metal tonnage is greater than paper because of its heavier weight). Finally, the department compiles the reported recycling rate information from all SWPUs and produces a single recycling rate report in November of each year.

When a data issue is identified, it typically results in a discussion between staff at DEQ and the SWPU. The SWPU may be asked to submit additional information or DEQ staff may decide to adjust the reported material's specific tonnages to conform with the *Code of Virginia*, criteria established in the regulations, or departmental guidance.

Data Collection Methods and Sources Affect Reported Recycling Rates

As shown by the formula, to determine the recycling rates, the SWPU must know how much MSW has been generated. Localities determine the amount of generated MSW using different methods and sources. For example, Appomattox County reports the material that is disposed of in their landfill and also includes responses to a survey of county businesses. Montgomery County, by contrast, reported on the JLARC staff survey that only the weights of materials from drop-off sites are collected.

In discussions with DEQ staff, it was suggested that the ideal situation would be for each SWPU to compare the amount of recycled material to the amount of waste produced. However, according to DEQ staff, at the time the regulations were first instituted, the ability of SWPUs to accurately measure such amounts varied

widely and as a result, the department tried to provide flexibility in how those amounts could be determined. DEQ staff also stated that localities were very interested in being able to count any materials that were recycled, regardless of whether it was MSW.

SWPUs use different methods and sources to collect recycling and MSW tonnages. Table 16 illustrates the sources used by respon dents to the JLARC staff survey of local recycling programs, which include single-locality and multi-locality SWPUs. As the table shows, no single source of solid waste or recycling data was used by all respondents in 2007. The most frequently cited sources of data were (1) weights and volumes from solid waste facilities, (2) weights and volumes of recyclables at drop-off centers, and (3) surveys of businesses.

Table 16: Data Collection Methods Used by 85 Localities for MSW Generated and Recyclables Collected in 2007

	MSW Generation		Recycling	
	Number	Percent	Number	Percent
Weights / volumes at facilities	74	87.1%	n.a.	n.a.
Weights volumes at drop-off sites	42	49.4	73	85.9%
Per person, per day estimation	10	11.8		
Surveys of businesses	24	28.2	56	65.9
Surveys of institutions	18	21.2	37	43.5
Surveys of recycling processors	n.a.	n.a.	48	56.5
Weights / volumes through curbside	n.a.	n.a.	45	52.9
Weights / volumes delivered to materials recovery facilities	n.a.	n.a.	45	52.9
Weights / volumes delivered to transfer stations	n.a.	n.a.	43	50.6
Weights / volumes delivered to other MSW facilities	n.a.	n.a.	41	48.2

Note: n.a., not applicable.

Source: JLARC staff survey of local recycling programs, summer 2008.

Differences in data collection efforts can affect local recycling rates. SWPUs able to employ more robust data collection efforts that address commercial, institutional, and residential waste sources may be able to identify greater amounts of recycling information that could boost their individual recycling rates. The following case study demonstrates how a locality can benefit from surveying local businesses, schools, or other non-residential entities.

Case Study

Appomattox County, with a population of approximately 14,000, reported a 2006 recycling rate of 29.1 percent, 14 points better than its State-mandated minimum rate of 15 percent. Each year, the county mails surveys to 50 to 100 local businesses. According to county staff, inclusion of tonnage from these entities is the cornerstone of the program, and it would be almost impossible for the county to reach its

mandated minimum rate if the businesses in the jurisdiction did not report.

Nonetheless, locality responses indicated that surveys of local businesses are not used in 19 of the 55 localities for which a response was available.

Furthermore, since the statewide recycling rate is based on SWPU and locality reporting, data which does not get collected at the local level reduces the comprehensiveness of the information being reported to DEQ each year. As a result, material that was collected for recycling may not be accounted for when DEQ calculates the statewide recycling rate.

Differences in data collection efforts are also found in how SWPUs target State agencies and universities. The Department of Waste Management's 1994 State agency recycling annual summary report stated that agency recycling can assist localities with meeting their mandates. The report recommended that agency recycling coordinators contact the local government coordinators as a resource for the agency programs. The report also states that at the time, some localities and State entities had combined resources to operate a joint program. Additionally, some localities were permitting State entities to use public recycling collection centers and some State entities were permitting local residents to use their collection centers.

JLARC staff surveyed State agencies and institutions of higher education regarding their reporting processes. As Table 17 illustrates, 51 respondents indicated they had not reported on the amount of recyclables they collected to any other entity. (In addition, 13 legislative agencies that responded to the survey indicated that they did not report their recycling information to any other entity. Such responses were not included among the 51. For most

Table 17: State Agencies and Universities Are Not Reporting Recycling Tonnage to SWPUs

Entity to Which Data Is Reported	Number of Responses		
	State Agencies	Institutions of Higher Education	Total
Not Reported to Any Entity	38	13	51
Locality and/or SWPU	3	8	11
DEQ	4	0	4
DGS	7	2	9
Other	2	1	3

Note: Respondents could choose more than one option. However, none of the respondents who chose "not reported" chose more than one option.

Source: JLARC staff survey of State entities, summer 2008.

of these agencies, DGS is responsible for the collection of their recyclables. DGS reported that it did not report such information to any other entity.) According to a limited number of survey responses, State agencies and institutions of higher education generated approximately 14,000 tons of recyclables in FY 2007.

There are concerns about the accuracy of the State's reported recycling rate due to the varying efforts at data collection and reporting used by the localities. Recognition of the need to improve data collection and reporting is not new. In 2007, the technical advisory commission studying changes to the recycling requirements addressed similar concerns about the comprehensiveness of the data being collected.

Opportunities exist to collect more accurate and comprehensive recycling data at the local level, especially with regard to businesses and institutions. For example, to develop its national recycling figure, EPA uses data gathered from industry association, businesses, and government sources to develop an estimate of the materials generated, recycled, and disposed of. However, some local planning units do not have the resources to collect the information. The department could attempt to assist such planning units by developing a data collection instrument to make it easier to collect such information. Within resource constraints, the department may also be able to survey a sample of recycling processors in the State to acquire State-level data on the materials being recycled.

Recommendation (3). The Department of Environmental Quality should assist the data collection efforts of the solid waste planning units by developing and making available a standard survey collection instrument for businesses and institutions.

Majority of SWPUs Do Not Participate in Recycling Rate Training Sessions, but Participants Report Being Helped

DEQ offers training opportunities to improve data collection efforts of localities. However, most localities that responded to the JLARC staff survey question about these opportunities had not attended a training session. The training sessions describe how to collect information, what sources to use, and how to complete the recycling rate report. Also, department staff are available at the sessions to answer questions about the reporting process.

In March and April 2008, DEQ held four training workshops to discuss the new recycling rate calculation formula and answer questions with local recycling coordinators. Individuals representing 40 jurisdictions participated in the workshops (Table 18). According to DEQ staff, as a result of reductions in travel funding,

Table 18: DEQ Provided Four Recycling Rate Training Sessions in 2008

Date and Format	Participating Solid Waste Planning Units
March 4, 2008 conference call	Buchanan, Dickenson, Wise, Scott, and Russell Counties
March 20, 2008 video conference	Botetourt, Montgomery, Patrick, Pulaski, and Franklin Counties; City of Radford; and Towns of Blacksburg and Christiansburg
March 27, 2008 conference call	City of Newport News
April 2, 2008 conference call	Virginia Peninsulas Public Service Authority; Southeastern Public Service Authority; Northern Shenandoah Valley Regional Commission; Cities of Manassas and Alexandria

Note: See Appendix J for a list of solid waste planning units and member localities.

Source: Information provided by DEQ, July 2008.

the workshops were held by conference call or video conference. In addition to these workshops, DEQ staff also stated that they provided information on calculating the rate to ten jurisdictions through individual phone calls between January and March 2008. Department staff also notified all recycling rate report contacts of guidance or the availability of assistance four times between January and March 2008.

Despite the number of localities represented at these sessions, more than half of the localities for whom a response was available did not attend a training session (Table 19). Had they done so, they would have likely benefited from the experience because respondents that did participate rated the workshops as very helpful or somewhat helpful.

In the following example, the city may have benefited from obtaining DEQ training on how to better capture recycling data:

Case Study

One locality that may have benefited from such training is Manassas Park City. The city reported a 2006 recycling rate

Table 19: More than Half of Respondent Localities Did Not Attend a DEQ Workshop in 2006, 2007, or 2008

	2006		2007		2008	
	Number	Percentage	Number	Percentage	Number	Percentage
Very helpful	17	20.0%	18	21.2%	22	25.9%
Somewhat helpful	19	22.4	24	28.2	17	20.0
Not helpful	0	0.0	0	0.0	0	0.0
Did not participate	49	57.6	43	50.6	46	54.1
Total	85	100.0	85	100.0	85	100.0

Source: JLARC staff survey of local recycling programs, summer 2008.

of 9.9 percent and a 2007 rate of 7.8 percent, despite a curbside recycling program and high population density (5,580 persons per square mile). Part of the city's low reported recycling rate appears to result from a lack of accurate information about the amount of recyclable material being collected in the locality. For example, city staff stated their belief that its residents take their yard waste to the Prince William County landfill, and as a result, the city does not get credit for such material. According to staff of the private contractor providing recycling collection to the city, the weight of recyclables is measured using weight tickets; however, a set-out rate was not available for the curbside program. Additionally, the city does not canvass businesses about their collections, although city staff claim they are currently working on a 'recycling mandate' for local businesses. According to city staff, no one took part in the 2008 training session that would have provided assistance regarding the 2007 submission. The staff person indicated that any assistance from DEQ would be welcomed.

As discussed, DEQ provided four emails about training session opportunities to local staff they have identified as involved with recycling. The department may want to consider a process to verify locality solid waste reduction and recycling staff throughout the year to ensure that the appropriate individuals are receiving the department's notices. The department could send an electronic mail notification to all of its local contacts and ask for verification that the person is still actively involved with recycling. Such an action may help increase the amount of interaction between the department and the SWPUs.

DEQ Oversight of Reports Is Limited by Resources

Ensuring the accuracy of the information reported on the recycling rate reports is important when determining if the mandated recycling rate has been achieved. However, according to DEQ staff, the department does not have the resources to perform more detailed evaluations of the data it receives than those described earlier in this chapter. Two DEQ staff share responsibility for verifying the locality recycling rate reports. These staff also have other responsibilities within the department. Due to time constraints, there is little opportunity to review the background information used to prepare recycling rate reports, according to staff at the department. As was discussed in Chapter 4, in the mid-1990s, when the program was organized within the Department of Waste Management, greater resources were available for local assistance, including on-site audits of the information used for reporting.

Statutory changes to the Virginia Waste Management Act in 2006 allow for localities to include non-MSW waste totals as part of their reported total tonnage. Prior to these changes, localities could not include non-MSW materials in their recycling rate calculations. Under current law, SWPUs can receive a credit of one ton for each ton of recycling residue generated in Virginia and deposited in a landfill, a credit of one ton for each ton of solid waste material that is reused, and a credit of one ton for each ton of any nonmunicipal solid waste material that is recycled. However, the amount of credits available is limited to no more than five percent of the SWPU's annual recycling rate.

DEQ staff stated that they are fairly confident that the reported data is accurate. Still, the potential exists for data to be reported that should have been reported differently or not included. For example, JLARC staff identified a situation in which it appears non-MSW materials have been included as supplemental recyclable material when it should not have been.

Case Study

In 2006, a locality included as a supplemental recyclable material the amount of tonnage associated with targets that were being recycled from a military installation within the jurisdiction. Had this material been included as part of the credit calculation as it appears it should have, the locality's reported rate would have been 16.4 percent rather than the reported rate of 38.3 percent verified by DEQ. Even if an adjustment had been made, the locality's reported recycling rate would have still surpassed its mandated rate of 15 percent.

According to DEQ staff, instances such as that just described are particularly difficult to identify. First, tonnages are reported in aggregate by material, not classified by source, so it would be difficult to determine the source of the material for any additional evaluation. Second, DEQ staff rely on red flags or significant changes in annual data to identify potential reporting issues. However, the department does not employ an evaluation tool to ensure each report is consistently reviewed for the same issues.

As discussed earlier, localities complete the recycling rate reports manually and mail or fax the reports to DEQ. DEQ staff then reenter the data into a spreadsheet. Part of the verification process is to compare the data to the previous year. The extent to which DEQ staff have the resources to adequately verify each submission is questionable. As a result, the reported statewide recycling rate may not accurately reflect the actual amount of recycling occurring in the State. In addition, discard rates, or the amount of material

sent to a landfill from a recycling processor which would lower the actual rate, are not accounted for.

Opportunities exist to improve the data verification process. For example, planning units report their recyclable and waste disposal amounts to DEQ. The department indicates that it does compare reported recycling rates by SWPU to the rates reported in prior years. In addition, however, the department could standardize the reported amounts on a per capita basis and analyze those figures to identify extreme data points. (Tables G-1 and G-2 in Appendix G provide such an analysis.) Department staff could then contact planning units that report unusually high or low data to determine whether the information is accurate or should be amended. The benefits of such an evaluation are three-fold. First, it provides the department with an increased understanding of the data and confidence that the data are accurate. Second, the department can use the results to develop or clarify decision rules for data reported, to achieve greater consistency in what gets reported. Third, the department would have the chance to identify localities that are more successful than others and any best practices that might be applicable to other areas of the State. DEQ could also target assistance to planning units with particularly high per capita disposal rates and assign a higher priority to assisting with implementation of recycling action plans for those planning units with recycling rate below the mandated rate.

In addition to the changes for enhancing DEQ's review of the reported data, the repetition of manually entering the reported recycling rate data at the local and State levels should be eliminated by developing or making available an electronic reporting system that would allow planning units to report the information on-line. Such a reporting system should include processes for checking reported information against established formulas in order to identify potential discrepancies.

Recommendation (4). The Department of Environmental Quality should institute a formal review process of the recycling rate reports from each solid waste planning unit to ensure the accuracy of the reported information. The review process should permit the department to identify unusually high or low reported data and assess the credibility of that information.

Recommendation (5). The Department of Environmental Quality should develop or make available an electronic reporting system for the local recycling rate reports that includes a process for identifying potential data discrepancies.

Chapter 8

Local Recycling Programs

In Summary

Solid waste planning units (SWPUs) have implemented differing recycling programs to meet the State's recycling mandate. While a core set of recyclable materials is collected throughout much of Virginia, localities differ in the primary collection method used. Curbside collection is more common in urban areas, while drop-off sites are used in most rural areas. Local spending on recycling services varies considerably.

Based on data reported to DEQ, most SWPUs (63 of 74 units in 2006 and 66 of 74 in 2007) are achieving recycling rates at or above their mandated rate. The recycling data indicates that population density does impact recycling rates, in large part because curbside collection programs appear to be most effective in achieving high participation rates. The State's recycling programs could be improved by expanding access to curbside service. In addition, participation by residents could be increased through education and outreach.

Each locality in Virginia is required to create or participate in a recycling program, and, as noted in the mandate for this study, about $1.6 million is available from a State litter prevention and recycling grant fund program for those efforts. The mandate also states that local recycling programs "face funding shortfalls and are unable to fully execute their missions." Virginia's waste reduction effort relies heavily on the SWPUs meeting their recycling rates. In light of these concerns and the importance of local recycling efforts, JLARC staff reviewed the effectiveness of local recycling programs.

LOCAL RECYCLING PROGRAMS DIFFER WIDELY THROUGHOUT VIRGINIA

As noted in Chapter 2, local governments in Virginia have traditionally been responsible for managing municipal solid waste. Localities have substantial flexibility to design recycling programs that reflect local circumstances and available resources. As a result, local and regional recycling programs differ in important ways, including their primary collection method for recyclables, total spending on recycling services, use of ordinances and financial incentives, and whether they function as an independent locality or as part of a regional partnership.

A Core Set of Recyclable Materials Is Collected Throughout the State

In Virginia, localities and regional bodies choose the materials to be collected through their recycling programs. According to the JLARC staff survey of local recycling programs, more than 25 different materials are being collected for recycling through curbside services, drop-off sites, or special collection events. More than 75 percent of the respondents indicated collecting the following five materials through their curbside, drop-off, or special collection efforts:

- paper, including newspapers, magazines, and office or mixed paper;
- cardboard, both corrugated and non-corrugated;
- aluminum;
- steel; and
- plastics 1 and 2.

In addition to this core set of materials, materials collected by at least 70 percent of survey respondents include

- lead-acid batteries;
- used oil/oil filters/antifreeze;
- tires;
- copper;
- clear and colored glass;
- yard waste, including grass, tree, and shrub trimmings; and
- electronics, such as computers, TVs, and VCRs.

Materials that appear less likely to be collected through Virginia's recycling programs (collected by about one-third or fewer of survey respondents) include food waste, plastics 3 through 7, plastic bags, and textiles. (See Appendix D for a description of plastics 1-7.)

Whether a material is being collected appears to depend in part on the strength of its market. As discussed in Chapter 3, localities and regional bodies may be reluctant to collect materials that are costly to collect and process or difficult to market. It is relatively

costly to process and transport materials such as glass and plastics 3 through 7, and respondents to the JLARC staff survey generally rated the market for such materials as weaker than for other materials. Despite these concerns about recyclable glass, however, a majority of survey respondents indicated collecting the material through their recycling program.

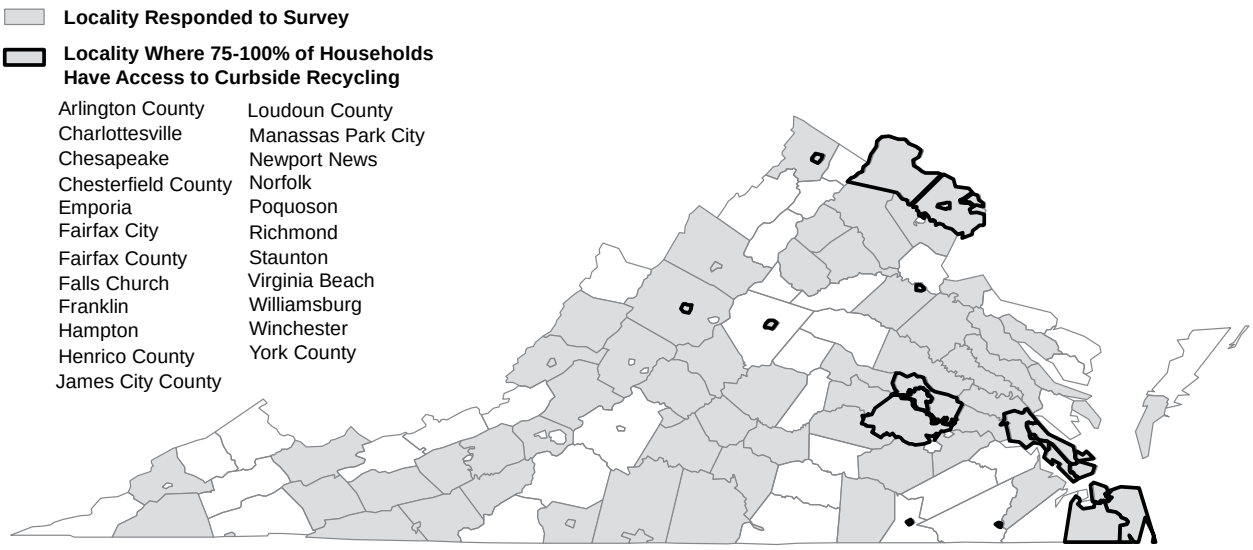
Recycling Collection Methods Vary With Population Density and Geography

Whether a locality uses a curbside service or a network of drop-off sites as the primary means of collecting recyclables depends partly on its population density. Results from the JLARC staff survey suggest that curbside collection programs are most often found in more densely populated parts of the State. A total of 23 localities responding to the survey—or 27 percent of respondents—indicated that at least 75 percent of their single-family homes, townhouses, and condominiums have access to curbside collection services. Sixteen of these localities can be classified as urban, with more than 1,000 persons per square mile, and all 23 localities have at least 400 persons per square mile. As shown in Figure 13, curbside collection programs available to at least 75 percent of households are found in urban centers in the eastern third of the State.

Curbside collection of recyclables is substantially less common in areas with lower population densities. Results from the JLARC staff survey and interviews with localities suggest that little or no curbside collection is available in most rural parts of Virginia. Instead, more sparsely populated communities are likely to rely primarily on drop-off sites to collect recyclable materials. While 19 of 24 urban localities responding to the survey (79 percent) indicated some curbside service was available, only 12 of 36 rural lo calities (33 percent) indicated this. Seventeen of these 36 rural localities indicated relying exclusively on drop-off collection sites. In the 12 rural localities that indicated curbside recycling was available, such service was available to 25 percent or less of the single-family homes, townhouses, and condominiums in each of the responding localities. In some counties, curbside services was limited to the residents of a single town.

Survey data also suggest that rural localities with minimal to no curbside service provide more drop-off sites than their urban counterparts. Nearly 60 percent of the 36 rural localities with little or no curbside service reported operating seven or more drop-off sites for their residents. By contrast, 12 of the 16 urban localities serving at least three-quarters of their single-family residents with curbside service indicated operating four or fewer drop-off sites.

Figure 13: Survey Responses Indicate Curbside Collection Programs Serving 75 Percent or More of Households Are Mostly in Urban Areas



Note: Households include single-family homes, townhouses, and condominiums.

Source: JLARC staff survey of local recycling programs.

The following case studies illustrate how collection methods vary with the population density of a locality.

Case Studies

Arlington County has a density of more than 7,500 persons per square mile. The county provides curbside collection of recyclable materials for all 32,100 single-family and duplex residences in the county. Residents receive a free 18-gallon bin for glass, metal, and plastic containers. Cardboard and mixed paper must be bagged or tied and set next to the bin at the curb. These materials are collected weekly, on the same day as trash collection, by a contractor. In addition to the curbside program, the county also provides two drop-off sites for residents and businesses. The sites are unstaffed and open nights and weekends.

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Floyd County has a population density of 39 persons per square mile. Curbside collection of recyclables is limited to the Town of Floyd and its roughly 430 residents. In addition, residents and businesses throughout Floyd County can take newspaper, mixed paper, cardboard, metal and glass containers, plastics 1-2, and other materials to any of 12 drop-off sites operated by the county. The sites are unstaffed and open nights and weekends.

The solid waste literature has described the use of curbside programs in urban areas and drop-off sites in rural communities. However, the literature also emphasizes that drop-off collection can be an important part of both rural and urban recycling programs. As one review of recycling indicates, drop-off sites may be the most cost-effective way to collect recyclables in rural areas, and can be an important alternative for urban and suburban residents who miss their curbside collection day or wish to recycle items not collected at the curb.

Spending on Recycling Varies Widely and Depends on the Nature of the Recycling Program

As discussed in Chapter 2, localities and regional bodies provide most of the public funding for recycling services in Virginia. Although exact spending by the SWPUs is difficult to estimate, data obtained from 75 localities and regional bodies that responded to a JLARC staff survey of local recycling programs indicate that expenditures for their recycling and solid waste reduction efforts totaled more than $48.7 million in FY 2007. By comparison, the State provided approximately $1.6 million to localities and regional bodies through the Litter Control and Recycling Grant Fund in FY 2007. And, as discussed in Chapter 4, most Virginia localities have chosen to spend their grant funding on litter control activities. Based on survey responses received from 66 localities, the median per capita expenditure for their recycling and solid waste reduction efforts was $4.38.

Local spending on recycling and waste reduction varies widely and depends on factors such as the services provided, the total population served, and the extent to which private companies provide waste management or recycling services. For example, one county reported recycling expenditures of nearly $2.5 million in FY 2007. Major spending items included paying private contractors to operate a compost facility, maintaining 18 drop-off sites, encouraging recycling through public education efforts, and covering administrative costs. A smaller county with a more limited recycling program reported substantially lower expenditures of $5,000 in FY 2007. The county's spending was limited in part because all recycling services, including the operation of drop-off sites and the processing of recyclables, were provided by the operator of a private landfill permitted in the county. Much of the $5,000 was used to pay for education and outreach as well as 18-gallon recycling bins for schools and a limited number of residents.

Few Localities Use Ordinances or Financial Incentives To Promote Recycling

The *Code of Virginia* grants localities the authority to promote recycling through a variety of mandatory ordinances and financial incentives. However, it appears that few localities have adopted such measures. For example, section 15.2-937 of the *Code of Virginia* enables localities to require by ordinance that "any person… separate solid waste for collection and recycling." Nonetheless, recycling remains voluntary for the vast majority of residents in Virginia. Ten localities—approximately 12 percent of survey respondents—indicated having such mandatory separation ordinances in effect (Table 20). Most of these localities indicated rarely or never taking enforcement action against known violators, though nearly all ordinances included an enforcement provision.

Table 20: At Least Ten Localities Have an Ordinance Requiring Individuals to Separate Recyclables For Collection

Locality	Scope of Ordinance	Enforcement Provision
Arlington County	SF, MF, T, B, I	Yes
City of Alexandria	MF, B, I	Yes
City of Emporia	SF, MF, B, I	Yes
City of Fairfax	SF, T, B	No
City of Staunton	SF, MF, T, B	Yes
Fairfax County	SF, MF, T, B, I	Yes
Loudoun County	SF, MF, T, B, I	Yes
Nelson County	SF, MF, T, B, I	Yes
Prince William County	SF, MF, T, B, I	Yes
Wythe County	SF	Yes

Note: SF, single-family homes; MF, multi-family dwellings; T, townhouses; B, businesses; I, institutions.

Source: JLARC staff survey of local recycling programs, summer 2008.

At least eight localities have ordinances prohibiting private solid waste haulers from landfilling recyclable materials. These measures may be important for localities that rely on private operators to provide recycling services. For example, Prince William County supplements its mandatory separation ordinance with a requirement that private waste haulers providing curbside trash collection also provide curbside recycling collection. The ordinance has an enforcement provision, and county staff indicated a willingness to fine violators for landfilling recyclables. Solid waste haulers may be more likely to landfill recyclables when markets are poor or the cost of landfilling is comparatively cheap.

It appears that a similarly small number of localities use financial incentives to encourage voluntary recycling. Section 15.2-928 of the *Code of Virginia* allows localities to "grant incentives to encourage recycling," and DEQ staff believe this provision authorizes

the use of tax incentives, grant funds, and pay-as-you-throw (PAYT) or variable rate pricing systems for trash collection. However, only ten localities—or 12 percent of localities responding to the JLARC staff survey of local recycling programs—indicated using such incentives. Seven of these localities reported increasing landfill tipping fees in part to encourage recycling. Through interviews, JLARC staff identified an additional three localities that operate PAYT programs.

Localities also have the authority to promote recycling and waste reduction within local government agencies and buildings. Under section 15.2-938 of the *Code of Virginia*, localities can require by ordinance that local government agencies and departments give preference to procurement bids that include recycled paper when awarding contracts for paper and paper-related products. In addition, ordinances or written procedures can be used to promote recycling, reuse, or source reduction efforts by local agencies. According to the JLARC staff survey, only 11 localities—or less than 15 percent of respondents—indicated having formal ordinances or written procedures in place. However, recycling and reuse may still occur without formal policies. Botetourt County has no formal recycling policy for its government buildings and agencies, but the county provides its staff with opportunities to recycle office paper and beverage containers.

Results from the JLARC staff survey suggest that localities are more likely to encourage recycling by banning materials from landfills. The *Code of Virginia* allows localities to ban cathode ray tubes (CRTs) and yard waste from private landfills in their jurisdictions if programs have been developed to recycle these materials. Localities can ban these and other items from public landfills as well (the extension of authority to ban CRTs from public landfills was granted by the 2008 General Assembly). Approximately half of the localities responding to the JLARC staff survey indicated using such landfill bans. In addition to CRTs and yard waste, localities have banned the following items:

- construction and demolition debris (CDD) material such as bricks, concrete, ceramic tile, and asphalt;
- electronics;
- appliances such as dishwashers and refrigerators;
- automobiles; and
- propane tanks.

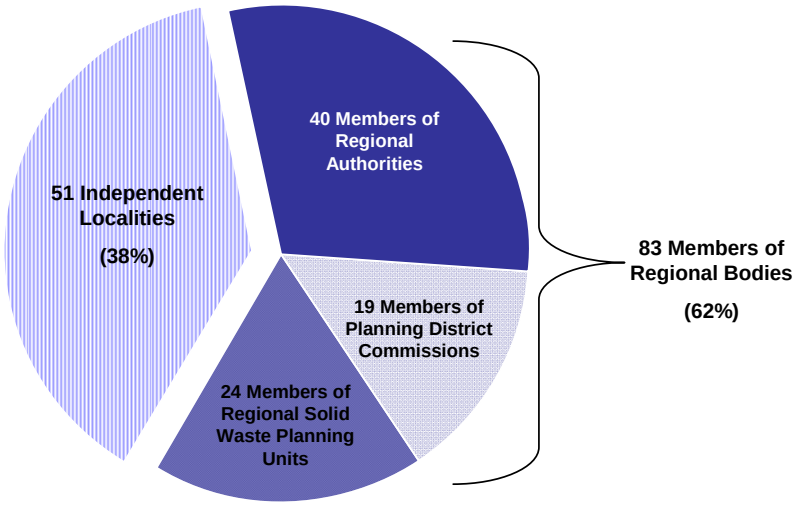
Most Localities Manage Their Recycling Programs Through Regional Partnerships

The *Code of Virginia* permits localities to coordinate solid waste and recycling efforts through regional partnerships. Section 10.1-1411 of the *Code of Virginia* enables localities to form regional SWPUs to develop and implement "comprehensive regional solid waste management plan[s]." In addition, the Virginia Water and Waste Authorities Act (§15.2-5102 *Code of Virginia et seq.*) permits localities to form solid waste authorities and grants authorities the right to build and operate solid waste facilities, issue bonds to raise revenue, and use eminent domain.

The majority of localities in Virginia manage their solid waste and recycling services through 20 regional SWPUs. As Figure 14 shows, more than 60 percent of counties and cities—or 83 localities—currently manage some or all of their recycling efforts through a planning unit, regional planning district commission, or solid waste authority. The extent of coordination in these bodies varies widely. Members of some solid waste authorities, such as the Central Virginia Waste Management Authority and the Southeastern Public Service Authority, rely primarily on their authority to provide refuse and recycling services.

By contrast, coordination is more limited in other regional bodies, such as planning district commissions. The Northern Neck Plan-

Figure 14: More than 60 Percent of Virginia Counties and Cities Manage Their Recycling Programs Through Regional Bodies



Note: Virginia contains 134 counties and cities.

Source: JLARC staff analysis of data from DEQ.

ning District Commission, which includes the Counties of Lancaster, Northumberland, Richmond, and Westmoreland, developed the regional solid waste management plan, calculates the annual recycling rate, and operates a litter prevention program. All other recycling services, including the collection and processing of recyclables, are provided by the member localities.

Localities cite both advantages and disadvantages of participating in regional solid waste bodies. Regional bodies have been credited with making recycling more cost-effective by achieving economies-of-scale in the collection and marketing of materials. More than 40 percent of localities responding to the JLARC staff survey of local recycling programs strongly or somewhat agreed that regional bodies reduce the per-ton cost of recycling, and 56 percent agreed that they make it easier to find markets for recyclables. However, staff with regional bodies in several parts of the State cited difficulties accessing recycling markets during interviews with JLARC staff.

Members of regional bodies have also noted that more densely populated localities can bear a disproportionate responsibility for meeting the region's recycling mandate. Recycling staff for one member of a regional body told JLARC staff their locality, as well as others where curbside collection is widespread, "carry" the more rural members that use only drop-off sites to collect materials.

MOST SOLID WASTE PLANNING UNITS MEET OR EXCEED THEIR MANDATED RECYCLING RATES

A vast majority of the State's 74 SWPUs reported meeting their mandated recycling rates in 2007. Nonetheless, some did not. Factors that appear to affect the extent to which SWPUs meet their mandated rates include population density and participation in regional bodies.

Eighty-Nine Percent of SWPUs in Virginia Met 2007 Mandated Recycling Rates

Sixty-six of the 74 SWPUs in Virginia met or exceeded their mandated recycling rate in 2007 (Appendix J). A slightly smaller number, or 63 SWPUs, met or exceeded their mandates in 2006. These 66 planning units exceeded their mandated rates by an average of more than 12 percentage points. Twenty-eight of the 30 SWPUs required to meet a 25 percent minimum either met or exceeded their rate, while 38 of the 44 SWPUs qualifying for the 15 percent minimum either met or exceeded their rate.

Table 21 shows the ten SWPUs reporting the highest recycling rates in 2007. All reported recycling rates are above 40 percent, and were as high as 55 percent in the Town of Vinton. A majority

Table 21: Ten SWPUs With Highest Reported Recycling Rates

Solid Waste Planning Unit	2007 Reported Recycling Rate	2006 Reported Recycling Rate	Population Density (Persons Per Square Mile)
Town of Vinton	55.7%	35.7%	2,470.3
City of Falls Church	53.0	51.7	5,640.0
Town of Vienna	52.6	55.1	3,380.0
Central Virginia Waste Management Authority	50.3	46.3	434.9
City of Bedford	47.2	37.5	885.7
Virginia Peninsulas Public Service Authority	44.9	34.5	251.0
Rappahannock Regional Solid Waste	44.8	40.4	507.7
Town of Herndon	44.7	39.1	5,209.0
City of Roanoke	42.9	37.2	2,179.6
Bedford County	41.7	37.8	88.1

Note: Reported recycling rates are the adjusted recycling rates and include credits.

Source: JLARC staff analysis of data from DEQ. Population data are from the Weldon Cooper Center for Public Service and the U.S. Census Bureau.

of these planning units were located in Northern Virginia, the Richmond-Central Virginia region, and the Tidewater region. In most cases, the ten SWPUs are either densely populated localities or regional bodies with relatively large total populations. Only one of the ten SWPUs qualifies for the 15 percent recycling mandate. Together the planning units comprise 23 percent of the State's population, or approximately 1.8 million people, and account for roughly 20 percent of the total MSW generated in Virginia in 2007. As the table also shows, variation among reported recycling rates occurs annually. Changes from 2006 to 2007 in reported recycling rates ranged from a reduction of three percent to an increase of 20 percent.

Eight SWPUs Reported Recycling Rates Below Their Mandated Rate in 2007

Eight of the State's 74 SWPUs reported recycling rates in 2007 that did not meet their mandate. These eight planning units, listed in Table 22, were located in Northern, Southside, and Southwest Virginia. With the exception of the City of Alexandria, these planning units have relatively small populations, accounting for less than five percent of the State's total population, and produced approximately five percent of the total MSW generated in Virginia in 2007. Six of the eight SWPUs reporting low recycling rates in 2007 have population densities below 100 persons per square mile, qualifying them for the 15 percent mandate. At least four of those planning units appear to rely mainly on drop-off sites to collect re-

Table 22: Eight SWPUs Reported Recycling Rates Below Their Mandated Rate

Solid Waste Planning Unit	Reported Recycling Rate / Mandated Rate (2007)	Reported Recycling Rate / Mandated Rate (2006)	Population Density (Persons Per Square Mile)
City of Manassas Park	7.8/25%	9.9/25%	5,580.0
Lunenburg County	11.5/15	12.2/15	30.7
Botetourt County[a]	11.7/15	18.5/25	61.1
Lee County	12.2/15	11.0/15	54.6
Brunswick County	12.8/15	8.5/15	32.7
Southside Regional Public Service Authority	13.4/15	17.4/15	42.9
Floyd County	14.5/15	11.0/15	39.6
City of Alexandria	21.8/25	24.3/25	8,995.5

Note: Reported recycling rates are the adjusted recycling rates and include credits.
[a] The mandated recycling rate for Botetourt County was lowered to 15 percent in 2007

Source: JLARC staff analysis of data from DEQ. Population data are from the Weldon Cooper Center for Public Service and the U.S. Census Bureau.

cyclable materials. The remaining two localities—the Cities of Alexandria and Manassas Park—are relatively dense communities in Northern Virginia, must meet a 25 percent recycling rate, and operate more extensive curbside collection programs.

Although there is some variation in reported recycling rates from year to year, these eight SWPUs have struggled to meet their mandated recycling rates in recent years. Seven of the eight planning units also did not meet their mandated rates in 2006. The Technical Advisory Committee on recycling in Virginia, along with the Virginia Recycling Markets Development Council, recognized this difficulty and in 2005 recommended a 15 percent rate mandate for localities with a population density below 100 persons per square mile or an unemployment rate at least 50 percent greater than the statewide average.

Several factors may account for the low recycling rates reported by these eight SWPUs. As mentioned above, six of the eight planning units collect recyclable materials largely through drop-off sites, which are generally accepted as being less convenient than curbside collection. In addition, local recycling staff also cited difficulties in promoting their recycling programs among local residents and with collecting data to document all the recycling that takes place in their localities. Localities report having difficulty collecting accurate and comprehensive recycling data from area businesses or private contractors providing recycling services. Finally, only one of the planning units listed in Table 22 managed their re-

cycling programs through regional bodies. An analysis of 2007 recycling data (see Appendix G) found participation in a regional body to be an important predictor of a locality's reported recycling rate.

The following case study illustrates how limited public outreach and data collection problems have contributed to consistently low reported recycling rates in one Northern Virginia locality:

> ***Case Study***
> *The City of Manassas Park has a population density of approximately 5,540 persons per square mile. The city operates a curbside recycling program for all its residents, provides 4-cubic yard collection containers at some apartment complexes, and maintains two drop-off locations. The city has reported a recycling rate of under 10 percent each year since 2003. Recycling staff attribute the city's low rates to low levels of participation in the curbside program, the lack of a mandatory recycling ordinance, and limited resources to promote recycling among residents. Staff also cite difficulty collecting recycling data from the limited number of businesses located in the city.*

CURBSIDE COLLECTION AND PUBLIC OUTREACH INFLUENCE THE EFFECTIVENESS OF RECYCLING PROGRAMS

Although some differences in reported recycling rates between SWPUs reflect differing data collection methods, some recycling programs appear to be more effective at collecting recyclables than others. Some SWPUs recognize a need to improve the effectiveness of their recycling efforts. Approximately one-third of respondents to the JLARC staff survey of local recycling programs—including rural, suburban, and urban localities—rated the effectiveness of their waste reduction programs as fair or poor. JLARC staff survey results, interviews with recycling experts, and the solid waste literature suggest that the curbside collection of recyclables and public outreach are two important factors influencing the effectiveness of recycling programs. Expanding access to curbside services and improving setout rates through educational campaigns could increase recycling rates in certain parts of Virginia.

Recycling Appears To Be Most Effective When Curbside Collection Is Available

Data limitations prevent making ties between curbside collection and high recycling rates in Virginia. However, curbside collection is generally recognized in the literature as the most effective collection method for achieving high recycling rates. The EPA noted

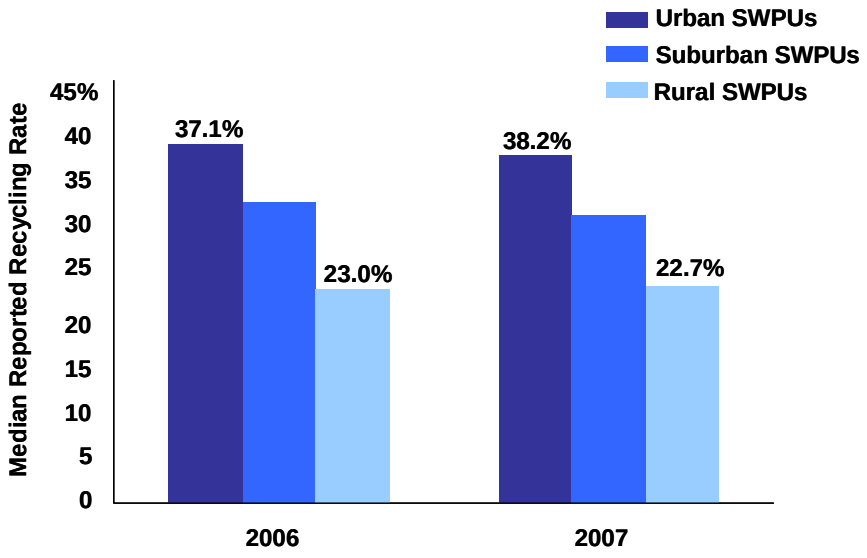
that curbside collection is more effective than drop-off sites in maximizing the amount of recyclable materials collected. A 2002 review of local recycling programs in Minnesota concluded that the use of curbside collection and population density are two factors that influence recycling rates. And a 1999 review of the solid waste literature explained:

> Curbside recycling programs decrease the household's time and effort devoted to recycling. Households are expected to respond by recycling more, while municipal governments collect more, save disposal costs, and earn greater revenues from the sale of materials.

In addition, there appears to be an association between curbside collection and high reported recycling rates in Virginia. As discussed below, Figures 15 and 16 show that urban areas are associated with higher recycling rates, and curbside collection appears more common in densely populated areas.

Curbside collection is effective primarily because it offers individuals a convenient way to recycle. Interviews with recycling experts and literature reviews indicate that convenience is an important

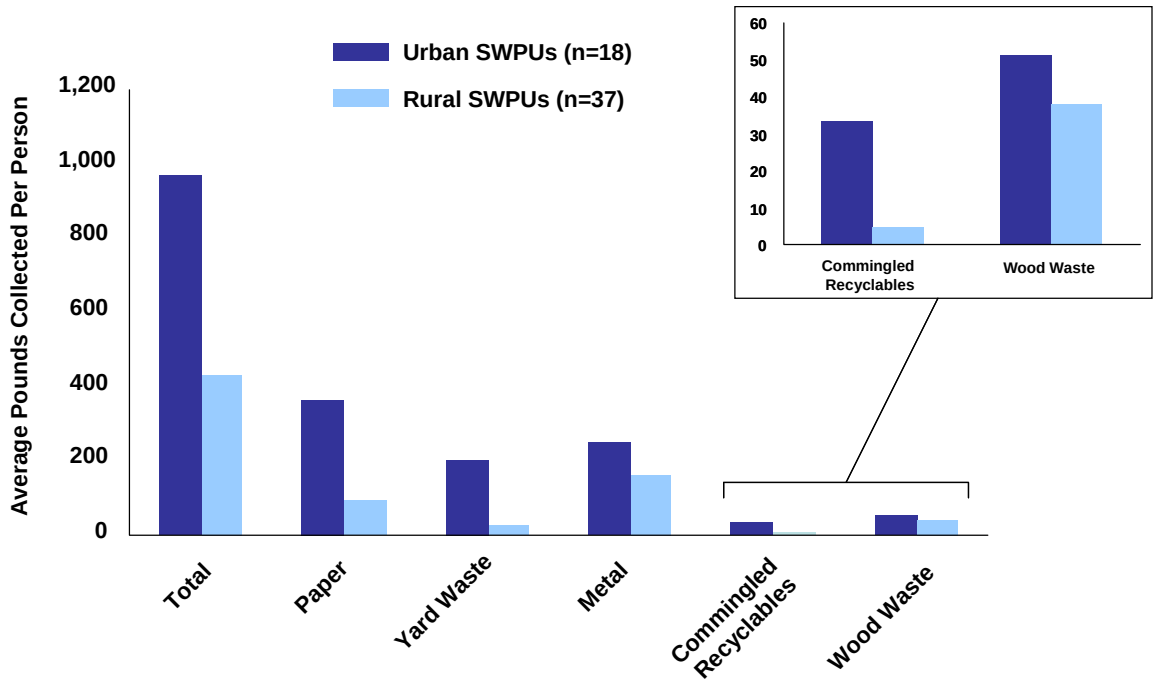
Figure 15: Urban SWPUs Have Reported Higher Recycling Rates Than Rural SWPUs in Recent Years



Note: In 2006 and 2007, 18 SWPUs were classified as urban. In 2006, 18 SWPUs were classified as suburban and 38 as rural. In 2007, Fauquier County's classification changed from rural to suburban; therefore, in 2007, 19 SWPUs were classified as suburban and 37 as rural.

Source: JLARC staff analysis of data from DEQ.

Figure 16: Urban SWPUs Reported Collecting More Recyclable Material Per Person Than Rural SWPUs in 2007



Notes: See Appendix D for a description of the materials.

Source: JLARC analysis of data from DEQ.

factor influencing the effectiveness of recycling programs. Reports by the Government Accountability Office (GAO) and EPA have also highlighted convenience as critical to diverting a maximum of solid waste from landfills. Staff with recycling programs in Virginia emphasized that recycling must be convenient and easy to ensure that residents and businesses participate. Convenience is particularly important because recycling is largely voluntary in Virginia, and most localities do not offer financial incentives to encourage participation in recycling programs.

Curbside collection programs are likely to be most cost-effective in areas where the population is relatively dense. Localities emphasized to JLARC staff that curbside collection is often not feasible in the more sparsely populated parts of the State. One recycling advocate explained that when the population is widely dispersed, collection trucks must cover large distances to collect relatively small amounts of recyclables. In this case, the cost of collecting a ton of recyclable material may be substantially higher than landfilling, and curbside collection may not be financially prudent for the locality. In addition, as discussed in Chapter 3, the small volume of material collected may limit the revenue gained from the sale of the material.

By contrast, drop-off sites are generally regarded as a more cost-effective collection method for rural communities. EPA noted in its 1999 review of successful recycling programs that drop-off sites can serve as the primary collection method in rural localities where most residents must self-haul their trash. In addition, the solid waste literature has emphasized that drop-off programs can be an efficient alternative when curbside collection is not feasible.

The effectiveness of curbside programs may be one reason why urban SWPUs have historically reported higher recycling rates and more material collected than rural SWPUs. As discussed above, curbside collection is more common in more densely populated parts of the State. Moreover, a JLARC staff analysis of 2007 recycling rate data found population density to be associated with higher reported recycling rates (Appendix G). Figure 15 shows that in both 2006 and 2007, the median recycling rate for SWPUs with population densities greater than 1,000 persons per square mile was substantially higher than the rate for planning units with densities under 100. Similarly, Figure 16 indicates that the 18 SWPUs classified as "urban" collected an average of 968 pounds of material per resident, while 37 rural planning units collected approximately 426 pounds of material per person on average. Urban SWPUs also collected substantially larger amounts of paper, yard waste, and commingled recyclables on average. A similar pattern was found for recyclables collected in 2006.

Curbside Recycling Programs Could Be More Effective

Efforts to improve the State's recycling rate could be aimed at increasing participation in curbside recycling programs. In some localities, this would mean expanding curbside service to include additional single-family homes, townhouses, and condominiums, particularly in areas with moderate to high population densities. According to data from the JLARC staff survey of local recycling programs, six localities responding to the survey had densities of 800 persons per square mile or higher but reported providing no curbside services. Improving the effectiveness of curbside recycling programs could also mean increasing the percentage of residents that consistently set out recyclables for collection. Increasing a locality's "setout rate" is a cost-effective way to improve recycling rates because few additional costs are incurred in collecting more material. Data from the JLARC staff survey of local recycling pro grams indicate that there are opportunities to increase setout rates. Of the 41 localities reporting that some curbside service is available, 19 (49 percent) reported a setout rate of less than 50 percent. Seven of these 19 localities, with a total population of nearly 2 million, indicated that curbside service was available to 75 percent or more of single-family homes, condominiums, and townhouses.

Focusing on curbside programs is a cost-effective approach to increasing the State's recycling rate because it targets relatively dense localities that account for a large share of the MSW generated in Virginia. As discussed above, curbside programs can maximize the volume of material collected and minimize collection costs in areas with high population densities.

Public Outreach Is Key to a Successful Recycling Program. One important factor influencing the success of both curbside and drop-off recycling programs is the extent to which residents understand how and why to recycle. In its review of local recycling programs, GAO concluded that public education and outreach efforts were important to increasing recycling rates. Similarly, a profile of successful recycling programs by the EPA in 1999 found that every effective program profiled "promote[d] recycling through education, publicity, and outreach." The EPA review explained that education is important because local programs often differ and residents need to know what materials can be recycled, how and when those materials are collected, and other basic information.

Public outreach is a common component of local recycling programs in Virginia. Nearly every locality and regional body responding to the JLARC staff survey indicated making efforts to promote recycling through public education and outreach. The most common promotional efforts included presentations in schools and at community events, ads in local newspapers, and mailings to residents and businesses. More expensive promotional efforts, such as billboards and radio or TV advertisements, were less common.

Increasing public outreach is one way to improve participation in curbside programs with low setout rates. As the following case study illustrates, one Northern Virginia locality has developed a novel way to promote its curbside recycling program among its residents:

Case Study

The City of Falls Church has a population density of approximately 5,500 persons per square mile. The city operates a curbside recycling program for more than 3,000 single-family residences. Eligible households receive as many 18-gallon bins as needed to recycle mixed paper, cardboard, and mixed containers; yard waste and white metal goods are also collected at the curb, and the city provides special leaf collection services in the fall. The city recruits volunteer "block captains" responsible for educating local residents about how to participate in the recycling program, and city staff report that approximately 80 percent of eligible households set out recyclables weekly. Falls Church reported recycling rates of 53 percent in 2007 and 52 percent in 2006.

Additional Best Practices Could Improve the Effectiveness of Local Recycling Programs. In addition to improved public outreach and education, several best practices may improve the performance of local recycling programs. Many of these practices are designed to increase participation rates and divert a larger percentage of the waste stream from landfills. Interviews with localities and recycling advocates as well as a review of the solid waste literature suggest the following best practices:

- ***Making recycling more convenient and easy.*** GAO concluded that making recycling convenient and easy was the most important step to improving program outcomes. GAO and EPA provide examples of how curbside collection programs can be more convenient for individuals and organizations. For curbside programs, this may mean coordinating recycling with trash collection; for drop-off programs, it may mean co-locating sites with trash collection sites or near public areas such as shopping malls and parks. Finally, both drop-off and curbside programs can improve convenience by providing residents with free collection bins large enough to contain all recyclables generated before the next collection.

- ***Targeting a high percentage of the waste stream for recycling.*** A 1999 review of successful recycling programs by the EPA noted that targeting a wide range of materials for recycling can help localities achieve high recycling rates. The agency emphasized yard waste and several grades of paper, which together comprise approximately 47 percent of the MSW stream. EPA identified fall leaf collection as the "single largest contributor to waste reduction levels in communities with fall seasons," and a 2002 review of recycling in Minnesota found opportunities to increase the collection of paper. Other recyclable materials that could influence recycling rates include organic waste for composting and construction and demolition debris waste.

- ***Providing financial incentives to encourage recycling.*** Reviews by EPA and GAO have cited the benefits of using financial incentives to encourage recycling. Providing incentives that target individuals, such as variable weight pricing (also known as Pay-As-You-Throw) programs or a credit on the monthly trash bill for recycling, may increase participation in recycling programs. Localities can also use reduced tipping fees or tax incentives to encourage businesses to recycle or solid waste haulers to provide recycling collection services.

- ***Making recycling mandatory for residences and businesses.*** A majority of the successful recycling programs pro-

filed by EPA in 1999 had ordinances requiring residents to participate in recycling and composting programs. Localities and recycling advocates emphasized the value of a variety of recycling mandates, including landfill bans and source-separation ordinances for residents of single-family and multi-family dwellings as well as businesses. According to the EPA, although localities with recycling ordinances often do not actively enforce them, such ordinances signal a commitment to recycling by the locality.

- ***Partnering with localities to manage recycling programs through regional bodies.*** As discussed above, providing recycling services through regional bodies may be a cost-effective approach for some localities. A regional approach would allow participating localities to share some capital costs associated with recycling programs, such as a material recovery facility, a fleet of collection vehicles or a network of drop-off sites, and collection bins for residents. Regional partnerships may also allow rural localities to generate an adequate volume of recyclable materials to interested buyers. In addition, according to a JLARC staff analysis of data from DEQ, participation in a regional SWPU appears to be associated with higher reported recycling rates.

DEQ staff have provided recycling workshops for SWPUs on an annual basis since 2005. The department could use these workshops to share best practices among participants.

Recommendation (6). The Department of Environmental Quality should use its recycling workshops to promote practices that have been successful at increasing waste reduction in Virginia and elsewhere.

Chapter 9

2008 Legislative Issues Regarding Specific Materials

In Summary

During the 2008 legislative session, questions were raised about current Virginia disposal practices or the practices in other jurisdictions regarding beverage containers, plastic bags, and compact fluorescent light bulbs (CFLs).

Beverage container deposit laws, also known as bottle bills, have been enacted in 11 states, and generally require a refundable deposit on the purchase of the containers. The laws appear to substantially reduce litter, but evidence is lacking that they have a major impact on recycling rates. Similar legislation has been introduced in Virginia 26 times since 1974.

Fewer than five percent of the more than 91 billion plastic shopping bags used by consumers each year in the United States are recycled. Improperly disposed bags may negatively impact agriculture and natural resources. Several large U.S. cities have enacted ordinances to curtail the bags' availability.

CFLs are 25 to 30 percent more energy efficient and last much longer than standard incandescent bulbs. However, CFLs contain small amounts of mercury that can be harmful to human health. The introduction of voluntary CFL recycling programs at The Home Depot and IKEA as well as public sector initiatives should help reduce the potential for mercury contamination from the bulbs.

As discussed in Chapter 1, several bills related to issues of recycling and waste reduction were introduced during the 2008 General Assembly Session. In addition to a request for a JLARC staff review of container bills, two study resolutions were introduced concerning the disposal of plastic bags, and a third study resolution was introduced concerning the disposal of CFLs. These bills were withdrawn at the requests of the patrons. During deliberations of the House and Senate rules committees, it was decided that some level of consideration should be given to these issues as part of SJR 361.

BOTTLE BILLS INCREASE RECOVERY OF CONTAINERS BUT CAPTURE SMALL AMOUNT OF WASTE STREAM

Container deposit laws, popularly known as "bottle bills," require a minimum refundable deposit (most commonly five or ten cents) on certain beverage containers. The purpose of the bills is to reduce the amount of improperly disposed of containers and to limit their disposal in landfills. Most bottle bills cover steel, aluminum, plastic, or glass containers of liquor, beer, wine coolers, and carbonated

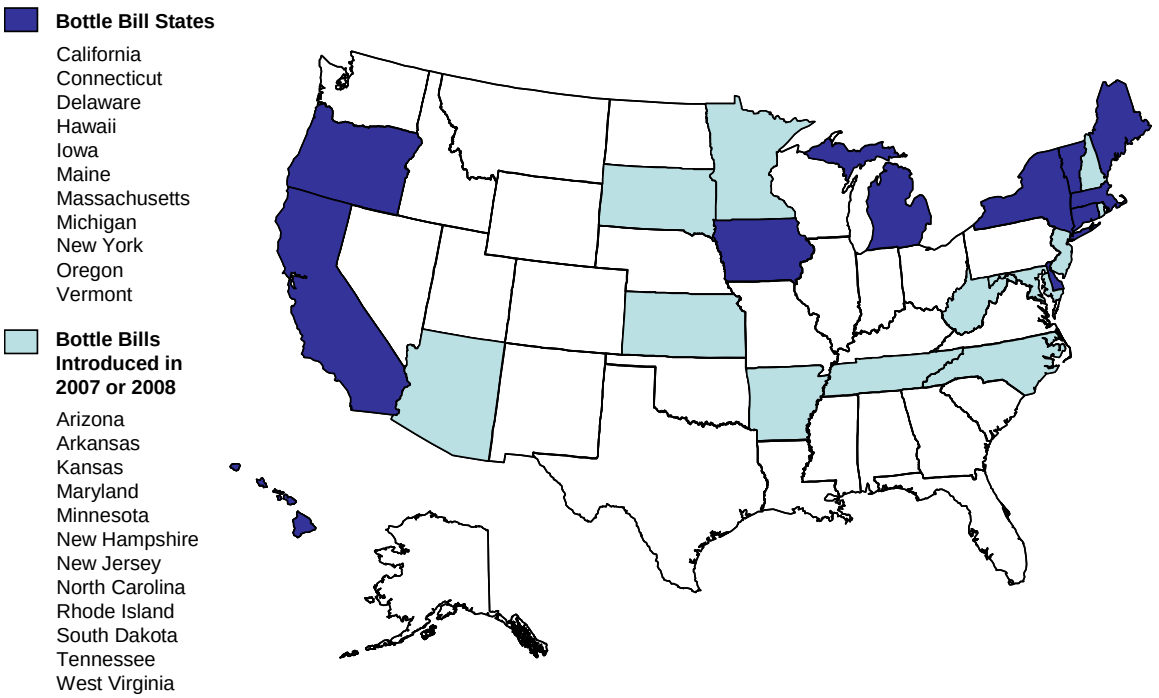
soft drinks. Currently, 11 states have container deposit laws, with all but Hawaii's 2002 bill being enacted in the 1970s or 1980s, and 12 states have considered bottle bills recently (Figure 17).

Bottle Bills Have Been Considered by Many States

A bottle bill has been introduced for the Virginia General Assembly's consideration at least 26 times since 1974, and a bottle bill study was done for the General Assembly in 1976. In 2008, a bill was introduced that would require all "on-premises" licensees of the Virginia Alcoholic Beverage Control Board to recycle their glass containers, if the locality in which they are located is within 50 miles of a recycling center. The bill is similar to a law implemented in North Carolina in January 2008, which also affects ABC permit holders but applies to aluminum cans and plastic bottles as well as glass containers. Such ABC laws only target beverages consumed at restaurants and bars and do not involve deposits on containers.

In 2007 and 2008, bottle bills involving container deposits were introduced in 12 state legislatures, including Maryland, North Carolina, Tennessee, and West Virginia. None were enacted although legislation for bottle bill studies passed in Rhode Island and West Virginia. A bill was also introduced in 2007 into the U.S. House of

Figure 17: Bottle Bills Exist in 11 States and 12 States Had Recent Bottle Bill Campaigns



Source: http://www.bottlebill.org and Container Recycling Institute.

Representatives to require a 5-cent deposit (adjustable for inflation) on every beverage container sold in the United States. No state has ever repealed its container deposit law, and some states have expanded their laws to cover bottled water, tea, sports drinks, and other beverages that have been introduced since most bottle bills were enacted. However, critics of bottle bills point out that all these containers still represent only a small portion of the waste stream.

Deposits Involve Businesses, Consumers, and Sometimes, the State

In most states, the process of collecting and redeeming container deposits involves only the beverage industry and consumers. In this scenario, when a retailer buys beverages from a distributor, the retailer pays the distributor a deposit for each bottle or can purchased. The consumer then pays the deposit to the retailer when buying the beverage. Consumers can get their deposit back when they return empty containers to retailers, redemption centers, or specially designed vending machines. Retailers recoup their deposits from distributors, who may also pay the retailers an additional handling fee. Distributors may recoup their deposits and other costs by selling the scrap bottles and cans and, in some states, by retaining the deposits of consumers who fail to return their containers. In five states, however, the state becomes involved in the process because these unredeemed deposits become state property (with Michigan returning 25 percent to retailers for handling costs). Three of these states use at least a portion of the unredeemed deposit monies to fund recycling programs.

Differences Between Recovery, Redemption, and Recycling

Recovery is the first step in diverting materials from disposal and making them available for recycling. Redemption of materials such as used beverage containers may occur via a deposit system, allowing those materials to be recovered. Not all recovered containers, however, are necessarily recycled. Recycling requires the existence of a market for the materials and delivery of materials to that market.

Supporters of Bottle Bills Point to Decreased Litter and Increased Recovery Rates, but Opponents See Many Drawbacks

Bottle bills are generally enacted to reduce litter, divert containers from landfills and increase recycling rates, and reduce incidence of injury to humans and farm animals from broken glass. Studies have attempted to measure the effect of bottle bills, and evidence supports their effectiveness as a litter reduction measure. One study showed that after bottle bills were enacted in six states, beverage container litter was reduced between 70 and 84 percent and total litter reduced from 30 to 64 percent. Recovery rates of beverage containers may also be increased. A study published in 2002 showed that in 1999, the ten states with deposit laws had an overall beverage container recovery rate of 72 percent while states without such laws had a 28 percent recovery rate. Recycling stakeholders in 11 U.S. cities interviewed by the Government Accountability Office in 2005 asserted that container deposits support municipal recycling by providing an incentive to recycle beverage

containers that are used outside the home, away from convenient recycling receptacles.

The high-quality recycled glass from states with bottle deposits is in demand by glass manufacturers, including one large manufacturer with two facilities in Virginia. This company imports recycled glass from Michigan, Massachusetts, and Connecticut to its Virginia facilities. According to a company representative, 80 percent of the recycled glass used in their North American facilities comes from states and a Canadian province with bottle deposits.

Critics of bottle bills point to their low impact on recycling and uncollected deposits as reasons for opposition. They note that bottle bills affect only a small portion of the waste stream, estimated by the EPA as less than six percent of municipal solid waste. They also claim that consumers are charged a hidden tax unless they bring the container back, and in fact, redemption rates have been decreasing in recent years. Moreover, they argue that requirements for beverage distributors and retailers to store and transport the containers to recycling markets, if markets are available, are costly and burdensome. They claim that curbside recycling programs are more cost-effective for capturing beverage containers along with other materials for recycling and that comprehensive litter control measures are more effective at reducing all kinds of litter; thus, policies to encourage such programs that affect more materials without penalizing consumers or the beverage industry should be implemented instead.

Michigan's Longstanding Bottle Deposit Law Provides Income for the State but May Not Increase Recycling Rate

One state's experience reveals the complexities of determining whether a bottle bill is an effective waste reduction policy. The state's Bottle Deposit Law has been in effect since 1978. The details of the law have varied over time, but currently a 10-cent deposit is charged on metal, glass, paper, or plastic containers of beer, soft drinks, carbonated and mineral water, wine coolers, and canned cocktails. Redemption rates are high—the Michigan Department of Treasury reports a 97-percent annual average redemption rate from 1990 to 2006. The state retains 75 percent of the unclaimed deposits, and a portion of those funds is the state's sole source of funding for its waste reduction programs. One problem with the law is that some consumers bring bottles and cans purchased out of state to Michigan to collect a deposit; a 2000 study estimated these fraudulent redemptions at about $10 million a year.

According to staff at Michigan's Department of Environmental Quality (MI DEQ), the bottle bill is very popular with the public, is

mostly self-sustaining, and produces a steady, high-quality supply of materials for glass manufacturers in Michigan. It is difficult to determine whether or how the bottle bill has affected Michigan's recycling rate because recycling data are not required to be reported to the state. However, even with a 97-percent container redemption rate, the state's most recent estimated recycling rate is only 20 percent. Because Michigan does not require recovered containers to be recycled, it is also difficult to determine the percentage that are recycled. However, MI DEQ staff believe that most are recycled. Additionally, in 2004 the state enacted a landfill ban on beverage containers covered by the deposit as part of an attempt to discourage the importation of trash from other states and Canada.

DISPOSAL OF PLASTIC BAGS AND COMPACT FLUORESCENT LIGHT BULBS IS RAISING CONCERNS

Disposal of plastic bags and CFLs has been gaining nationwide attention recently. Improperly disposed of plastic bags may become litter and impact natural resources. CFLs contain small amounts of the element mercury, which can be harmful to human health under certain conditions.

Improperly Disposed Plastic Shopping Bags May Negatively Impact Agricultural and Natural Resources

Plastic shopping bags are ubiquitous in U.S. society. More than 91 billion plastic bags were used nationwide in 2006. The popularity of plastic shopping bags among consumers is tied to their convenience. Additionally, the low cost of the bags compared to paper bags makes them attractive to retailers. However, plastic bags have disadvantages to their use as well. Because they are so lightweight, they can quickly become a litter issue when improperly disposed of. Also, recycling opportunities for the material are limited. Furthermore, the plastic may foul recycling equipment.

Plastic Bag Issues in Virginia. Improperly disposed of plastic bags are raising concerns in some Virginia agricultural sectors. Cotton farmers in the southeastern part of the State have expressed unease about potential financial liability issues if plastic bags are baled with their cotton. JLARC staff were told by cotton farmers and a gin operator that plastic bags are getting into the fields and being harvested along with the cotton. Any plastic bags that go through the harvesting and ginning process will be shredded into fine particulate matter, which is impossible to remove from the rest of the cotton. These small plastic remnants do not hold dye and will show up as flecks when the cotton is processed into clothing or other uses, thus reducing the value of the material for the manufacturer. Under current international trade laws, the manu-

facturer can sue the cotton gin that initially processed the cotton for damages. According to the farmers and the gin operator, there is such a case pending before the U.S. Department of Agriculture. Similar concerns have been expressed by farmers of soybeans and other crops in other parts of the State.

The exact reason for the presence of plastic bags in farmers' fields is unknown. Potential reasons include waste haulers and individuals not properly securing their loads on the way to nearby landfills or transfer stations. Another factor may be improper storage of bags collected for recycling.

Efforts to address the issue have been initiated at the local and State levels. A local coalition has been formed in the southeastern part of the State to address the concerns and develop non-regulatory initiatives. Members include Isle of Wight County, waste haulers, the Chesapeake Bay Foundation, the agribusiness community, and the Southeastern Public Service Authority. The coalition finalized an action plan in August 2008 which relies on voluntary actions by retailers and citizens to better control disposal and encourage recycling. Additionally, the county has submitted a grant application to the Litter Prevention and Recycling Fund for an educational campaign. In addition, DEQ is studying the subject matter of 2008 legislation that would have given localities the authority to ban retail merchants from providing certain types of plastic carryout bags. This legislation (SB 711) was continued to 2009 and DEQ is studying the matter in the interim at the request of the Senate. DEQ is to submit a written report in the Senate Committee on Local Government by November 1, 2008.

Support For Plastic Bag Use Focuses on Convenience and Fewer Environmental Impacts Than Other Bags. Since their introduction in 1977, plastic bags have become a part of everyday American life. Consumers like them for their convenience. The bags are lightweight, easy to carry, strong, and can hold large amounts. Consumers also benefit because the bags can be reused repeatedly. They can also be reused as liners in garbage cans or for cleaning up after pets. The bags are also popular among retail merchants because they can cost substantially less—approximately five to seven cents per bag less—than paper bags.

Supporters of the use of plastic bags say the bags compare much more favorably than paper bags with regard to their impact on natural resources. According to information from the American Chemistry Council, compared to paper bags, the manufacture of plastic bags

- requires 40 to 70 percent less energy;
- results in 70 percent fewer air emissions; and

- uses less than four percent of the water.

In addition, most plastic shopping bags are made from natural gas, not petroleum. Moreover, retailers have begun implementing collection programs for recycling the bags they provide. Approximately 812 million pounds of plastic bags and film (roughly 54 billion bags) were recycled in 2006.

Critics of Using Plastic Bags Cite Litter and Pollution Issues. Complaints regarding the bags involve issues of litter and pollution. When improperly disposed, the lightweight bags are easily caught on the wind and carried into trees, bodies of water, and onto farm land. In bodies of water, the bags may cause problems for marine life that eat or become entangled in them. Bags can also cause damage to agricultural activities by becoming intertwined in crops or potentially eaten by livestock. (It has been alleged that a cow in the southeastern part of the State died after eating a plastic bag.)

Furthermore, EPA reports that only about eight percent of plastic shopping bags are recycled. Few planning units in Virginia that operate curbside collection programs accept plastic bags because there is little value for the material. Environmentalists also argue that the manufacture of plastic bags relies on petroleum and natural gas, both non-renewable resources. It has been estimated that around 12 million barrels of oil are needed for the amount of plastic bags manufactured annually in the United States.

Several major U.S. metropolitan areas have taken action to control the use of plastic bags in their jurisdictions. Seattle, San Francisco, New York City, and Los Angeles have all passed ordinances designed to reduce the usage of plastic bags. Cities have taken different approaches to the issue. For instance, beginning January 1, 2009, Seattle area grocery, drug, and convenience stores will be required to charge customers 20 cents per plastic bag. Five cents of that charge will be returned to the store for administrative purposes. Beginning in November 2007, San Francisco prohibited both large grocery stores and pharmacies from providing plastic bags to customers. Other jurisdictions have required retailers that provide plastic bags to establish recycling programs for the bags. Many other jurisdictions have also considered different types of action. In January 2008, China announced that certain merchants would be banned from providing plastic bags, especially those bags the state defines as ultra thin, and that ultra-thin bags would no longer be produced.

Virginia Is Home to a Major User of Recycled Plastic Bags. The composite lumber industry dominates the market for scrap plastic bags and film. Trex Company, Inc., is a manufacturer of such lumber and decking located in Winchester. According to the company's

website, seven out of every ten plastic shopping bags recycled in the United States are used in its manufacturing process. One method in which they acquire bags is to partner with public schools in Virginia and other states to hold plastic bag collection drives, where they provide the schools with prizes in exchange for the collected bags. The firm has received several awards from the Commonwealth for their environmental stewardship.

Public and Private Sectors Are Implementing Compact Fluorescent Light Bulb Recycling Programs

The use of CFLs is quickly increasing as a result of their energy savings potential and government and business programs to promote their use. CFLs use about 25 percent of the energy needed to power an incandescent bulb. Additionally, CFLs may last seven to ten years, substantially longer than incandescent bulbs. Government action will also increase the amount of CFLs in use. Federal action in 2007 requires all light bulbs to use 25 to 30 percent less energy by 2014. By 2020, bulbs must be 70 percent more efficient than bulbs in use today. Because incandescent bulbs convert only about five percent of the electricity they use into light, they would be banned under the legislation. As part of its effort to get households to switch to CFLs, Dominion Power has reported that switching out an incandescent bulb for a CFL may save $54 over the life of the bulb. Dominion has also undertaken a large program in Virginia to reduce the price of CFLs for consumers.

As a result of the push to increase their usage, CFLs have come under greater scrutiny. Of most concern has been the mercury content in each bulb. Mercury is a neurotoxin that can cause brain and kidney damage. According to EPA, about five milligrams of mercury, roughly the amount that would cover the tip of a ballpoint pen, is enclosed within a CFL. (By comparison, older style mercury thermometers could contain up to 500 milligrams. Furthermore, EPA reports that because CFLs use far less energy, the release of mercury by power plants related to incandescent bulbs is much higher than release of mercury when CFLs are used.) Concerns about what happens to the mercury when the glass in which it is enclosed cracks has led some jurisdictions, including seven states, to ban the disposal of CFLs in landfills. Both the public and private sectors are implementing CFL take-back programs.

Government-Initiated CFL Recycling Programs Take Many Forms. State and local governments are turning their attention to how to dispose of CFLs in a manner that is safe for both human health and the environment. For example, the Rivanna Solid Waste Authority has announced that it will accept CFLs at its two recycling centers in Albemarle County and the City of Charlottesville at no charge. Bulbs can be deposited into a collection container and then

transferred to a VDOT-approved container for transport. The authority has contracted to send the bulbs to a recycler located in Ashland, Virginia. The contractor processes the bulbs for the metal, clear glass, and phosphor powder. The powder will eventually be processed for the elemental mercury, which is then resold to manufacturers of mercury salts, mercury-containing devices, or used in electronics.

Pennsylvania has also moved to assist its residents with proper disposal. The state began providing more than 110 CFL collection containers to municipalities, small businesses, and community organizations in April 2008. Consumers recycle the bulbs by giving them to employees trained in the proper disposal of the material who add the bulbs to the containers. The bulbs are shipped to one of two processors for recycling. Maine, Vermont, and Illinois have also partnered with independent hardware retailers and other retailers to establish collection programs. In September 2008, a coalition created by the California State Assembly is expected to make recommendations about ways to

- make the collection and recycling of light bulbs, including CFLs, more convenient for consumers;
- educate the public about the proper management and recycling of light bulbs; and
- provide recycling information as part of the bulbs' packaging.

CFL Recycling Programs Initiated by Commercial Sector. Several national businesses have commenced CFL recycling programs. In June 2008, The Home Depot announced it had implemented an in-store CFL recycling program at all of its more than 1,900 stores in the United States. Consumers can bring unbroken CFLs to any store. According to its press release, The Home Depot will transfer the bulbs to another entity for transportation and recycling. IKEA has also offered a CFL take-back program at its U.S. retail stores. In addition to these retailers, Waste Management, Inc., implemented a universal household waste recycling program in July 2008 that includes CFLs. Consumers will be able to go online and order a postage-paid waste recycling kit. Consumers pay $14.95 for a re-sealable, non-permeable bag that holds up to 15 ten-watt CFL bulbs. (The U.S. Department of Energy indicates a nine-watt CFL is equivalent to a 50-watt incandescent bulb.)

Chapter 10

Future Direction of Waste Reduction Efforts in Virginia

In Summary

The State exerts a modest level of effort with limited resources currently directed to the purpose of waste reduction. It appears to be appropriate to at least maintain that level of effort. In light of Virginia's continuing high rate of per capita in-state waste disposal, it may be appropriate to increase the level of commitment to waste reduction. Actions which could be taken to improve upon existing efforts include greater use of fees to support existing programs or discourage excess waste, creation of a State-level position focused on waste reduction, added funds for public education or to support local programs, and the restriction of more materials from landfill disposal. These are areas which some other states have pursued to enhance their waste reduction efforts.

To guide waste reduction efforts for the longer term, it appears that a statewide plan is needed with measurable requirements and goals for the future. To supplement the existing minimum recycling rate requirements, the State could consider putting in place higher targets for localities to aspire to, and also establish and monitor progress toward a goal of lowering the tons of per capita waste that are disposed.

Preceding chapters of this report have focused on Virginia's current waste reduction goals and existing efforts to achieve those goals. The study mandate also requires a consideration of actions and goals that may be appropriate as the Commonwealth moves forward with its waste reduction efforts.

STATE'S EXISTING, MODEST EFFORTS AT WASTE REDUCTION SHOULD BE MAINTAINED

It appears to be reasonable and appropriate for the State to at least maintain its existing level of effort for waste reduction. As this report has documented, the State level of effort has been modest. Still, the current approach has some strengths. The State has a waste management hierarchy in place which reflects a preference for source reduction, reuse, and recycling over waste disposal. Although the State lacks a comprehensive plan with long-term goals and has a limited coordinating presence, solid waste planning units have developed plans which utilize the State's hierarchy in assessing how the waste stream might be managed over the next 20 years in the 325 counties, cities, and towns in Virginia. Relying on limited resources, local governments reportedly recycled almost three million tons of materials in 2007, and most planning units met their mandated recycling rates of 15 or 25 percent. The

data reported by planning units suggests a statewide recycling rate average of 38 percent in 2006 and 2007, exceeding the EPA's national goal of 35 percent.

However, the amount of in-state waste that is disposed on a per capita basis continues to be high at 1.14 tons per year, despite the level of recycling achieved. Also, there are weaknesses in the operation of State and local program efforts, some of which stem from limited resources. Concerns also exist regarding whether the recycling rate data is as accurate and as meaningful as it could be. A review of other states indicates that different approaches have been used to raise funds for their waste reduction activities. Virginia could use such additional funding to provide for expanded State and local waste reduction efforts.

The level of priority which the State and localities should give to waste reduction is a policy choice. However, if a decision is made to increase the State and/or local role, a number of actions could be taken in the short term to address program weaknesses. In addition, for the longer term, a statewide waste reduction plan and goals for recycling as well as lowering the waste disposed per capita could be essential for guiding State and local efforts.

POTENTIAL ACTIONS TO INCREASE STATE AND LOCAL WASTE REDUCTION EFFORTS

While Virginia's existing effort at waste reduction has some strong points, resources for these efforts have been limited, contributing to some program deficiencies and an inability to fully comply with State statutes. Potential funding sources are available to Virginia that have been used in other states. If additional resources are available, the State may wish to address some of the program deficiencies identified by the study mandate and this review. As one respondent to the JLARC staff survey of local recycling programs indicated, there is room for improvement with additional State assistance:

> I would like to see the State recycling goal increased to 35% BUT the State must help create more incentives for recycling programs and reuse by localities. Also, there must be an increase in recycling facilities and local markets willing to pay for recyclable materials.

There are also opportunities to reduce the amount of waste disposed without requiring additional resources, such as by instituting landfill bans and manufacturer take-back programs.

The extent to which such changes would result in significant reduction in the amount of waste disposed varies. None of these ac-

tions would necessarily result in less waste generation, but would likely result in less waste disposal. Additionally, if markets are not available, banned materials could be illegally disposed of, potentially creating environmental and human health hazards.

Potential Funding Sources Include Fees on Certain Products, Waste Generators, and Waste Disposal

Interviews with selected other states identified several different sources of funding for waste reduction activities. Of the states interviewed, South Carolina, Minnesota, and Pennsylvania are collecting the greatest amounts of funding for their waste management programs. Each of these three states has different funding sources for its waste reduction programs, with South Carolina assessing fees on certain consumer products, Minnesota taxing waste generators, and Pennsylvania assessing a surcharge on tipping fees. None of the three states relies on appropriations from their state's general fund to fund their waste reduction programs.

Fees Imposed on Consumers or Manufacturers of Certain Products Can Fund Their Disposal or Recycling. Other states' waste reduction activities are funded in whole or in part by fees imposed on certain products (Table 23). The fees may be used to fund disposal, recovery, or cleanup efforts related to the products, as with Virginia's fee on tires, discussed in Chapter 5. Or states may use all or a portion of the fees to fund a variety of waste reduction programs. The products affected by these so-called advance disposal fees (ADFs) are usually considered problematic or undesirable to dispose of.

Table 23: States Fund Waste Reduction Programs With Fees on Certain Products

State	Products Assessed a Fee
Kentucky	Tires
Maryland	Tires, motor oil, and certain electronics
Michigan[a]	Tires and certain beverage containers
North Carolina	Tires, appliances
South Carolina	Tires, motor oil, auto batteries, appliances
Tennessee	Tires, motor oil
Virginia	Tires

[a] Michigan's tire fee is assessed as part of the vehicle registration fee. Other waste reduction programs in the state are funded by a portion of unclaimed beverage container deposits.

Source: Interviews with state agency staff, state agency solid waste reports, and 2005 article in *Today's Tire Industry*.

In addition to ADFs, which are paid by consumers, fees may be assessed on manufacturers of certain products. Container deposits, or bottle bills, discussed in Chapter 9, also are a fee assessed on specific products although the consumer has the option to redeem

that fee. However, some consumers do not exercise that option, and Michigan uses a portion of the unclaimed container deposits to fund its environmental programs.

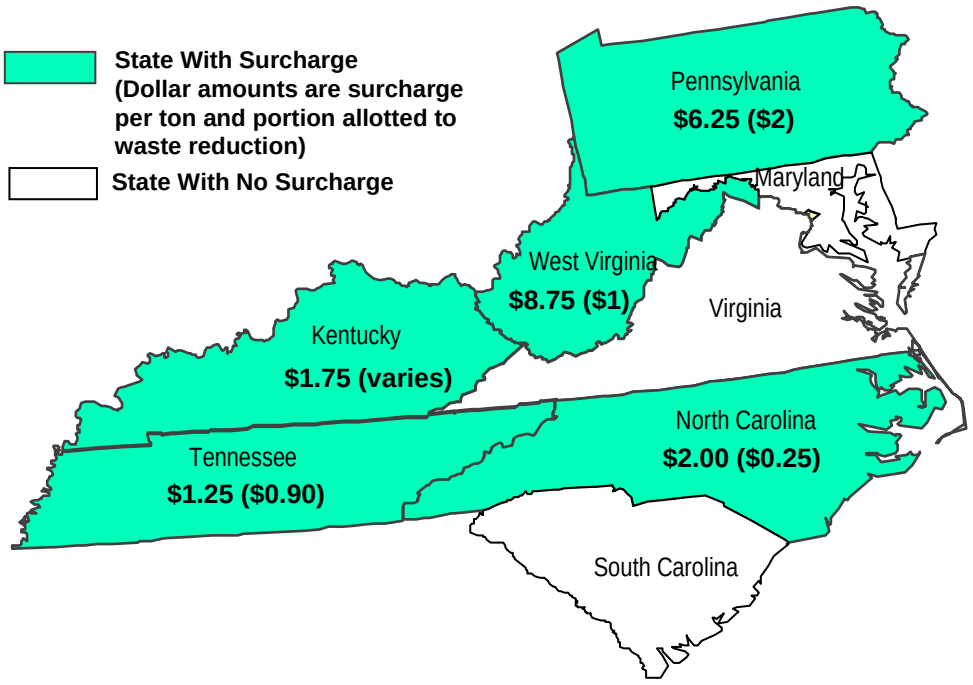
The most common ADF assessed is on the sale of new tires, and the $1.00 tire fee is the only ADF currently paid by consumers in Virginia. Of the states listed in Table 23, their fees range from $0.40 to $2 per tire. (North Carolina imposes an ADF of two percent on the price of the tire.) South Carolina funds its waste management and waste reduction staff and programs entirely through ADFs on the sale of tires, motor oil, automotive batteries, and appliances. These fees generated $6.9 million in South Carolina's most recent budget year, $4.8 million of which was allocated to grants to localities, schools, and universities.

As discussed in more detail below, Maryland assesses fees on manufacturers of certain electronics to encourage recycling of those products. Maryland uses a portion of those fees, and the fines collected for noncompliance, to reimburse localities for establishing permanent collection facilities, curbside pickup for seniors, and other electronics recycling projects. In FY 2007, $190,000 of registration fees went to 17 localities for such activities. Maryland also used the fees to provide public education and outreach in support of electronics recycling programs.

Tax on Producers of Waste. Another method of funding waste reduction activities is by taxing the producers of the waste. In essence, any entity that pays for waste services is taxed on the amount of waste produced. Minnesota's solid waste management tax is collected and remitted by public and private providers of waste management services. The tax is based on a percentage of the sales price for those services, including collection, transportation, processing, disposal and administration fees, and is currently set at 9.75 percent for residential generators and 17 percent for commercial generators; recyclables are not taxed. Lower rates apply to CDD and industrial and medical waste. According to staff at the Minnesota Pollution Control Agency, the tax is effective at encouraging waste reduction. The tax generates about $64 million a year, 70 percent of which goes to environmental programs, including local recycling programs, and 30 percent goes to the state's general fund.

Tipping Fee Surcharges Are Levied by Several States. Several states contacted by JLARC staff add surcharges to waste disposal fees at landfills or other facilities in order to fund environmental programs, including waste reduction programs (Figure 18). As shown on the map, four of the five states bordering Virginia assess such surcharges. The portion of the surcharge allocated to waste reduction varies.

Figure 18: Nearby States Fund Waste Reduction Programs With Portion of Tipping Fee Surcharge



Source: State agency websites and interviews with agency staff.

Of the states shown, West Virginia has the highest surcharge while Pennsylvania disposes of the largest amount of trash and allocates the largest total amount of the surcharge to waste reduction. The state's current surcharge is $6.25, of which $2 is dedicated for waste reduction programs. The $2 per ton fee has been in effect since 1988 and was recently extended to 2012; the fee applies to solid waste accepted at Pennsylvania's MSW landfills and material recovery facilities. (Of note, Pennsylvania accepts the largest amount of out-of-state trash in the nation. Trash imports have been declining slightly since the total tipping fee surcharge was increased by $4 per ton in 2002; still, the state accepted about 8.3 million tons of out-of-state waste in 2007.) The fee generated about $41 million for Pennsylvania's waste reduction programs last year, 70 percent of which is allocated for grants to municipal recycling programs and 30 percent for public education and technical assistance.

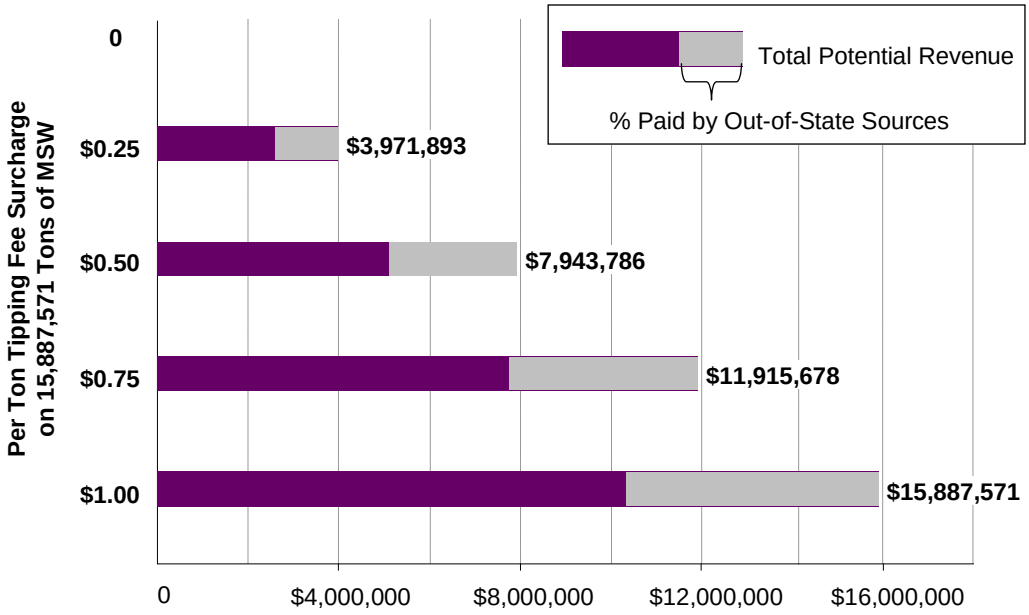
Of the states shown on the map, North Carolina most recently instituted a tipping fee surcharge. Its $2 per ton surcharge took effect in July 2008. The fee applies to waste disposed at the state's MSW and construction and demolition debris (CDD) landfills and waste shipped out of state through transfer stations. It is estimated that the fee will generate a total of about $24 million a

year—12.5 percent of that amount, or $3 million based on the estimated amount, will be allocated for waste reduction programs.

Figure 19 illustrates the revenue that would have been generated if Virginia had imposed a tipping fee surcharge of differing amounts on the MSW received at the State's permitted waste management facilities in 2007. For example, had Virginia applied a $0.25 per ton surcharge on MSW, more than $3.9 million would have been generated based on 2007 MSW tonnages (more than a third of which was from out-of-state sources). This amount is more than double the amount of funds that were allocated to localities in FY 2007 through the State's litter control and recycling fund. As the figure also shows, a tipping fee surcharge of $1.00 per ton would have generated approximately $15.9 million.

The tipping fee surcharge on MSW disposed of in Virginia would be paid in part by out-of-state sources and potentially could be low for Virginians. Based on the amount of MSW disposed in 2007, about 35 percent of the fee would be paid by out-of-state sources. In addition, based on current per capita waste disposal amounts, a $1.00 per ton surcharge would cost each Virginian only about $1.33 per year. Moreover, monies raised from a surcharge would be

Figure 19: Estimated Revenue From MSW Tipping Fee Surcharge on Disposal Amounts in Virginia, 2007



Note: According to DEQ's *Solid Waste Managed in Virginia During Calendar Year 2007*, more than 5.6 million tons of MSW were received in Virginia from out-of-state sources in 2007.

Source: JLARC staff analysis and DEQ, *Solid Waste Managed in Virginia During Calendar Year 2007*, June 2008.

a new revenue source, and would not be diverting current General Fund monies.

The General Assembly may wish to consider levying a tipping fee of $0.25 to $1.00 on each ton of MSW disposed of in Virginia. Revenue from such a surcharge could be used to fund efforts to meet State mandates at both the State and local levels. In addition, funding could assist with market identification and development through direct funding of a position at DEQ or through grant funding for recycling-related enterprises to locate or expand operations in Virginia. Monies from a surcharge could be used to fund grant programs for university research into expanding recycling efforts or the use of recyclable materials.

Recommendation (7). The General Assembly may wish to consider levying a surcharge of $0.25 to $1.00 on the fees imposed by facilities permitted by the State to accept and dispose of municipal solid waste. The General Assembly may also wish to consider dedicating the revenue generated from such a surcharge to waste reduction efforts currently under way and/or new waste reduction efforts.

Creation of State-Level Position Could Assist Localities and State Entities and Help Develop Recycling Markets

This report has identified some shortfalls in local and State efforts to increase their recycling activities. For example, some planning units are contacting fewer sources for recycling data than others. Additionally, a program or plan to guide university and agency recycling programs as required by the *Code of Virginia* does not exist. On the JLARC staff survey, localities identified a desire for an increased State role in developing recycling markets. If additional resources were identified, creating a position within DEQ to coordinate local and State efforts and to assist with market development may result in improved waste reduction overall. No such position currently exists within State government. Salary and benefits for such a position may be between $54,000 and $112,000 based on similar positions elsewhere in State government.

Assist Localities and State Entities. As also mentioned previously, local planning units and State agencies need assistance with administering their programs. Local planning units need help increasing the amount of materials collected and collecting comprehensive data. Currently, local staff seeking assistance may contact DEQ or DGS staff for assistance. According to staff at both agencies, when these situations arise, they try to ensure that the person with the need for assistance is directed to the appropriate agency. However, if there was a single point of contact, the need for contacting more than one agency could be eliminated. On the

survey, most respondents who had attended DEQ-sponsored recycling training reported that the session was very helpful. However, most respondents indicated that they had not attended such a training session, and some indicated that they did not know such training was available or that the sessions were not available to them locally. While DEQ staff tries to notify all local recycling coordinators about workshops and other events, staff also have other responsibilities that limit the amount of time they can allocate to such events.

State entities need guidelines identifying State expectations for their programs. Currently, these activities can only be completed on a limited basis. Prior to 1995, DEQ provided such assistance. In addition, the department issued annual reports identifying recycling activities employed by State agencies. The department also recognized agency success for outstanding recycling efforts. Recreating a position that encompassed all these activities could help to increase waste reduction activities.

Oversee Developing Recycling Markets. Respondents to the JLARC staff survey of local recycling programs cited a need for the State to become more involved in developing recycling markets. In response to the question "What should be the State's long-term waste recycling and reduction goals?", a respondent stated that "the main goal should be finding or developing markets so more types of material can [be] economically recycled." Virginia has studied the issue of developing recycling markets before and even created the Virginia Recycling Markets Development Council to assist in this area. However, regional SWPUs continue to frequently cite market development as an unmet need.

Because of this past experience, the State may want the position under discussion to also coordinate market identification and development activities. Such coordination may be time- and labor-intensive. However, such a position would have access to market information from around the State by virtue of its role in assisting planning units and State agencies. Such a position would also be able to coordinate and disseminate such information more easily and could potentially use DEQ's website to make the information more accessible and timely, as some other states have done.

Additional Funds Could Be Used to Support and Coordinate Public Education and Outreach

More than half of the responses on the JLARC staff survey of local recycling programs about Virginia's long-term goals indicated an increased State role was needed in public education and outreach, making it the third most frequently selected option, after funding and help developing markets. Public education and outreach ini-

tiatives that address recycling are designed to educate the public about what materials to recycle, when and where to recycle them, and the benefits attributable to recycling. However, such public education campaigns can also be expensive, according to staff at DEQ, the localities, and others. For example, a statewide litter prevention campaign was awarded about $250,000 between 2000 and 2002. According to the chairman of the State Litter Control and Fund Advisory Board that awarded the funding for the statewide campaign, successful public education programs are expensive because they require a consistent application of resources over time to achieve their result.

JLARC staff were frequently told by staff at the SWPUs that public education and outreach are important for successful recycling programs but that this is an area of unmet need in Virginia. Recycling coordinators and program managers in Maryland, Minnesota, North Carolina, Pennsylvania, South Carolina, and West Virginia, and at two Virginia military bases named public education and outreach as one of their most successful and essential waste reduction activities. At the national level, public awareness was the number one priority for recycling stakeholders interviewed in 2006 by GAO.

Public awareness can be increased by using many different forms of media—radio and television, newspapers, billboards, brochures, fact sheets, websites, personal messages from public figures, and school programs—to educate and promote desired practices. The Internet is a primary medium for disseminating information. Most state and local government websites link to information about government-provided services such as waste management and waste reduction. A user-friendly, well-organized website with information about these practices is especially helpful to new residents of a state or community.

Public recognition can also be a powerful form of outreach, and state-level recognition underscores the priority the state places on waste reduction practices. The Governors' offices in West Virginia and Pennsylvania issue press releases describing annual grant awards for recycling or litter prevention. In Virginia, DEQ made awards to State agencies for meeting certain recycling goals, and the department provides several awards annually through its Virginia Environmental Excellence Program.

The cost of producing educational materials can be reduced by using existing materials. Promotional and other educational materials need not be created from scratch nor is it necessary for each state or each locality to produce its own materials. Resources, including free materials, for schools and the media are available from EPA and other states. When a state government serves as the

central clearinghouse and purchases or arranges permission to use these materials, the materials can be disseminated to local governments. South Carolina has created a popular collection of cartoon characters to promote recycling and allows other states and local governments to use products featuring these characters with permission and acknowledgment of their source, but without charge. Twelve states and some local governments, including a few in Virginia, have used the characters.

Some topic areas where public education and outreach might be effective at reducing waste disposal are in encouraging home composting and providing information about variable rate pricing programs for waste disposal. According to EPA, yard and food waste account for the second and third highest materials, by tonnage, found in the U.S. MSW stream. Thus, the potential exists to improve waste reduction efforts by increasing the diversion of these materials from landfills to composting facilities, especially home composting units. Public outreach to educate households and other entities about the benefits of composting could result in less landfilling.

Public education and outreach could also be used to provide information about successful waste reduction programs operating in other states and within Virginia. For example, EPA identifies variable rate pricing of waste disposal (also known as Pay-As-You-Throw, or PAYT) as "the most effective single action that can increase recycling and diversion." Unlike most waste disposal programs, where the generator pays a flat fee for collection, in a PAYT system, the generator pays a rate depending on the amount of waste generated. Thus, there is a financial incentive to decrease waste. When combined with access to convenient and low-cost or cost-free recycling, or other alternatives to waste disposal such as composting, PAYT systems can result in overall waste reduction. Several Virginia localities already employ variable rate pricing systems, including Charlottesville, Lynchburg, Poquoson, York County, and, most recently, Prince George County.

Funding Could Be Increased for Local Programs

The improvement to the State's recycling and waste reduction activities that was most often cited as needed by respondents to the JLARC staff survey of local recycling programs was to provide greater State funding for local recycling and waste reduction programs. Fifty-nine of 83 respondents (71 percent) identified this as the most important option for improving the program. Some respondents to the survey even cited the recycling rates as unfunded mandates. Virginia provided about $1.6 million in non-general fund dollars in FY 2007 for local litter prevention and recycling activities, of which slightly more than a third was used for recycling.

As discussed in Chapter 4, localities often use this funding source to fund their entire litter program while using general fund monies to pay for recycling.

The State and local governments could use additional funding in a variety of ways. At the local level, funding may be used for purchasing recycling collection bins, drop-off containers, and providing public education and outreach efforts. State-level uses could include targeting financial assistance to planning units that have been identified as struggling to meet their recycling rate or as producing large amounts of waste. Providing grants to public schools to assist them with developing recycling programs has the potential to improve recycling rates. Few of the localities indicated that school recycling programs were operating in their jurisdictions, and those that did said that such programs were still new.

Currently, planning units receiving the noncompetitive grant funding must decide between spending the money on recycling or litter prevention activities. If additional resources are available, the State may wish to consider creating separate funds for the two activities. Such a change would eliminate the need for localities to prioritize one function over the other. It may also help localities to meet a State-mandated requirement.

Recycling Businesses Could Benefit From State Grant Funding

The State may wish to consider providing coordination between State marketing efforts and business interests. The Governor has on a couple of occasions used economic development funds to support recycling industries located in more rural areas of the State, such as Page and Sussex Counties. But State assistance to such businesses has been limited. The founder of one of Virginia's large recycling and processing facilities noted that smaller businesses are often discouraged from entering the recycling business because of small profit margins. State assistance primarily goes to localities and non-profits.

JLARC staff has learned of at least one small business interested in recycling activities that has had difficulty securing assistance from the State. In this instance, a start-up company that processes mixed recycled glass into a form usable by glass manufacturers was interested in locating in Virginia. According to a company representative, DEQ has been helpful, but an office designated to working with markets would be most beneficial as well as the availability of grants to help defray the cost of purchasing equipment. At the same time, a glass manufacturer currently imports recycled glass from other states to make new glass bottles and jars at its two facilities in Virginia. This company's representative stated that the company would prefer to use recycled glass from

Virginia; however, that glass would need further sorting and processing to remove contaminants, and no such processing facility currently exists in Virginia.

Recommendation (8). Contingent upon the provision of additional funding dedicated to waste reduction efforts, the General Assembly may wish to consider using the revenue to fund (1) the creation of a State recycling coordinator position organized within the Department of Environmental Quality to assist State entity and local recycling programs and to develop markets for recyclables, (2) public education and outreach efforts to expand existing waste reduction programs and develop new programs, (3) an increase in funding available to solid waste planning units for waste reduction programs, and/or (4) grants that would be available to processors and end users of recyclables to increase the amount of recycling activity occurring in Virginia. With the establishment of a State recycling coordinator position, the General Assembly may wish to consider eliminating the Virginia Recycling Markets Development Council.

Mandate Diversion or Manufacturer Responsibility for Certain Materials

Regardless of whether additional resources are made available for recycling and waste reduction, Virginia could consider expanding the list of products which are banned from landfills and making certain manufacturers responsible for the disposal or recycling of their products. Such actions would have the effect of reducing the amount of material that can be landfilled. In addition, recycling markets for the material may be developed or strengthened as a result of greater volume being available. However, where markets do not exist, such materials may end up being illegally dumped or burned.

Ban More Materials From Landfill Disposal. In addition to materials containing hazardous waste governed by federal laws, such as appliances containing Freon, most states ban other materials from disposal in landfills, such as whole tires and lead-acid batteries. Virginia bans lead-acid batteries and certain other waste materials. Newer products containing hazardous materials, such as used electronics (e-waste), are increasingly the target of new or upcoming bans. States may also ban other materials because they are bulky or can be readily recycled or reused, such as white goods (appliances) and aluminum cans (banned in North Carolina), and yard waste (banned in Michigan, North and South Carolina; Pennsylvania bans leaf waste that makes up more than half of a waste load). Disposal bans are most successful when convenient alternatives such as curbside pickup or dropoff sites exist for the banned

materials; otherwise, illegal dumping or burning of the materials may occur.

Of the selected states contacted for the JLARC staff review, North Carolina currently bans the most materials, including white goods, aluminum cans, whole tires, lead-acid batteries, and yard waste. Waste management staff consider the bans to be "very effective at diverting particular materials from North Carolina's landfills." Additional materials that will be banned beginning in October 2009 are motor vehicle oil filters, rigid plastic containers, wooden pallets, and oyster shells. Also that year, North Carolina's "take-back" legislation for manufacturers of computers takes effect, which includes a ban on the disposal of computers in landfills beginning in 2012.

Staff at North Carolina's Division of Pollution Prevention and Environmental Assistance (DPPEA) noted that such bans should be applied to hazardous waste and to materials that should be considered commodities. For example, the disposal ban on wood pallets should increase the supply of this material for the markets that already exist and potentially stimulate the development of new markets. The state estimates that the ban on wooden pallets (and non-glued woods) could result in the diversion of 500,000 to 650,000 tons of material per year. Before the bans take effect, DPPEA is giving priority to grant applications for projects that address wood pallets and other banned materials. In 2007, for example, business development grants were awarded to three wood pallet processors and three plastics recycling businesses. DPPEA is also increasing the level of technical assistance on proper handling of used oil filters.

Require Manufacturer Responsibility for Recycling Electronics. Used computers, cell phones, televisions, and other electronic devices (e-waste) are an increasing concern for waste managers. E-waste contains hazardous materials such as lead, cadmium, and mercury, and, according to EPA, the volume of e-waste almost doubled from 2005 to 2006, increasing to 3.8 million tons, and most of that material was disposed in landfills. These devices are frequently replaced by consumers due to improved technology, regular product upgrades, and extensive marketing. Moreover, it is expected that there will be an increasing number of older televisions discarded leading up to and after the federally mandated transition to digital signal transmission in February 2009.

A congressional resolution was introduced in 2008 calling for the United States to ban the export of toxic e-waste to developing countries. Currently, exportation for recycling is a major way such waste is managed. Industries and manufacturers in developing countries desire the raw materials in the electronics to help fuel

their growth. Passage of such a resolution could result in greater attention to this issue by the states, including increased landfilling of e-waste where that is permissible, or the expansion of recycling opportunities where they exist.

In Virginia and across the country, some localities have assumed responsibility for accepting e-waste at special collection events, and some have found paying markets for these products. But other localities have struggled to find markets or have had to pay recyclers to take the products. This recycling fee is often passed on to consumers, creating a financial disincentive for recycling for both the locality and consumer.

Some states have passed or are considering legislation requiring that manufacturers take responsibility for the fate of these products. In 2008, the General Assembly enacted legislation to address recycling of computer equipment. By July 1, 2009, manufacturers of such equipment are required to adopt and implement plans to collect the equipment in a way that is convenient and cost-free to the consumer (both at the time of purchase and drop-off). Manufacturers must also publish an annual report identifying the weight of the equipment collected, recycled, and reused. DEQ is responsible for maintaining a list of manufacturers that have prepared recovery plans and the Office of the Attorney General is authorized to take action against any manufacturer that fails to comply with the statute.

Other states have also implemented such "take-back" programs for electronics. Programs in some states include a manufacturer fee. Maryland's current program requires manufacturers who produced more than 1,000 electronic devices (such as computers, monitors, and televisions) per year in the preceding three-year period to pay a $10,000 registration fee to the Maryland Department of the Environment (MDE) in order to continue selling those products in the state. Annual fees are required thereafter, but manufacturers with an MDE-approved "take-back" recycling program pay a greatly reduced fee (those programs require that there be no fee imposed on consumers returning the devices). Non-complying manufacturers and retailers in Maryland (who by law cannot sell products of non-complying manufacturers) can be fined up to $5,000. Both West Virginia and North Carolina have similar legislation affecting manufacturers of computers and televisions taking effect in 2009.

FOR LONGER TERM, STATE PLAN NEEDED WITH GOALS FOR RECYCLING AND LOWERING PER CAPITA WASTE DISPOSAL

SJR 361 directs JLARC staff to make recommendations regarding what should be Virginia's long-term waste reduction strategy. In particular, it is noted that the State has not adopted a long-term

planning document and that only a small percentage of materials are being diverted from land disposal for recycling or mulching. In looking to the future, State waste reduction efforts would benefit from a single comprehensive planning document that is statewide in scope. In addition, the State could seek to expand on the mandated recycling rates by setting goals to reduce the amount of waste being produced on a per capita basis.

Other States Have Plans to Help Guide and Coordinate Waste Reduction Efforts

Several of the states contacted for this review produce statewide, long-range planning documents for solid waste management. North Carolina, South Carolina, and West Virginia have regularly updated statewide solid waste management plans. These states also produce extensive and informative solid waste annual reports. In addition to data on waste disposal and recycling, the reports describe the waste reduction activities of state government and localities, recycling commodity prices, and report on special programs such as scrap tire management and used motor oil recycling. Minnesota produces a solid waste policy report every two years. The report summarizes the current status of solid waste management, evaluates the effectiveness of programs, identifies issues needing further research, and makes recommendations. The writing process for Minnesota's 2007 Solid Waste Policy report included receiving public comments and input from stakeholders on the draft, which were incorporated into the final report.

Goals for Longer Term Should Address Recycling and Per Capita Waste Disposal Levels

As a companion to the goal of achieving a strong recycling rate, the State needs to set a goal for lowering the per capita waste disposal rate. Currently, the single measurable goal that is the focus of State law and DEQ monitoring for local program success is the recycling rate. While Virginia's reported recycling rate compares favorably to the national average, the in-State per capita waste disposal rate exceeds the national average. This is important because the states and localities which generate high amounts of waste per capita may have recycling rates which appear effective, and yet the amount of waste disposed per capita may still be high, suggesting a need for additional attention to source reduction efforts.

Revising the Recycling Rate Requirement and Setting Targets of Aspiration. One of the strengths of the recycling rate goal in Virginia is that since 2006, a distinction has been made for a locality's population density. Information gathered for this review indicates that population density is an important factor impacting the recycling rate which can be achieved. Data analysis also indicates that

the minimum recycling rate requirements of 15 percent for rural localities and 25 percent for others do not appear to be set too high (see Appendix G for a detailed analysis of waste generation, recycling, and disposal rates).

However, the appropriateness of the recycling rate requirements should continue to be reviewed and adjusted. For example, it appears that SWPUs serving areas with population densities of 1,000 persons per square mile or more are capable of meeting a minimum recycling rate of at least 30 percent. In addition, it appears that some localities could aspire to a recycling rate above the required minimums. For example, for some urban localities, a target of 35 to 40 percent does not appear beyond reach based on what some localities are achieving. For suburban localities, a target of 30 to 35 percent may be reasonable, and rural locations with the 15 percent requirement may still reasonably seek to achieve a 20 to 25 percent rate.

Setting a Goal Addressing the Amount of Waste Disposed. As noted in Chapter 1, some states are examining waste disposal levels, either in place of or as a supplement to recycling rates. Some states are setting waste diversion goals and calculating diversion rates. With this approach, the states seek to reduce the waste that is disposed through such activities as source reduction, reuse, recycling, and composting. Diversion goals measure the success of all waste reduction efforts used by a jurisdiction, unlike measuring only a recycling rate. For example, Virginia's source reduction efforts are not reflected in the recycling rates reported by the localities.

To implement a diversion rate, states select a baseline measure of their disposal levels, generally a per capita disposal amount identified in a previous year. The state then establishes a goal representing the percentage reduction the state wishes to achieve in this per capita level within a certain time. For example, West Virginia's goal is to reduce its baseline per capita waste disposal rate of 4.82 pounds per day (set in 1991) by 50 percent by the year 2010. Several other states have also adopted such goals (Table 24).

Determining a diversion or reduction goal that is both challenging and realistic may present a challenge, however. For example, population and economic growth, two factors that can substantially affect waste generation and disposal amounts, may need to be accounted for if the goal is to be realistic. Additionally, it will be important to achieve accuracy in the collection and reporting of recycling tonnage.

DEQ should develop a goal for reducing the amount of waste that is disposed which could be considered by the General Assembly for inclusion in the waste statute. The department may want to con-

Table 24: Some State Goals Encourage Reducing or Diverting Waste From Disposal

State	State Goal[a]	Reported Recycling Rate or Other Rate[b]	Mandatory Recycling or Provision of Recycling?[c]
Maryland	40% of waste diverted by 2005 (includes 35% recycling and up to 5% credits for source reduction)	44.7% diverted (41.2% recycled and 3.5% credit) (2006)	Yes
Michigan	50% of waste utilized by 2015 (includes recycling, source reduction, and other activities)	20% recycled (2005)	No
North Carolina	40% of per capita waste reduced by 2001 (based on 1991 amount)	25% increase (2007)	No
South Carolina	35% of waste recycled and maximum of 3.5 p/p/d disposed by 2005	31% recycled; 4.4 p/p/d disposed (2007)	No
Tennessee	25% of per capita waste diverted by 2003 (based on 1995 amount)	18% diverted (2003; not reported since)	No
Virginia	25% or 15% recycled in each solid waste planning unit	38.5% recycled (2007)	Yes
West Virginia	50% of per capita waste reduced by 2010 (based on 1991 amount)	Not reported	Yes

Note: p/p/d, pounds per person per day.

[a] In four states, target years for meeting goals have passed, but the goals still exist.
[b] Michigan and Tennessee have not reported rates since the dates listed.
[c] Maryland requires counties to recycle 20 percent or 15 percent of waste, depending on population; state government is required to recycle 20%. West Virginia requires communities above a certain population to provide curbside recycling. Virginia requires solid waste planning units to recycle 25 percent or 15 percent of waste, depending on population and employment.

Source: Interviews with state agency staff and state agency recycling and solid waste reports.

sider coordinating the development of such a goal with localities, recycling processors, waste management facilities, and other stakeholders. The workgroup should, at a minimum, identify what the State waste disposal reduction goal should be, as well as the strategies that would need to be implemented to achieve such a goal. If the workgroup's proposal appears appropriate and adequate, the General Assembly may wish to consider amending the *Code of Virginia* to require the implementation of a waste reduction goal in the Commonwealth.

Recommendation (9). The General Assembly may wish to direct the Department of Environmental Quality to (1) periodically examine the need to update the current minimum recycling requirements, (2) identify a waste reduction goal for Virginia that establishes a baseline amount of waste the State wishes to dispose of on a per capita basis, and (3) develop strategies that would be needed to implement such a goal. DEQ could report its finding to the General Assembly prior to the 2010 General Assembly Session.

List of Recommendations:

Waste Reduction Efforts in Virginia

1. The Department of Environmental Quality should determine the funding needs of local recycling and litter prevention efforts and report the amounts needed to fully fund each to the General Assembly by the 2010 Session. The General Assembly may wish to consider creating a separate fund from which to provide grant funding for local recycling efforts.
2. The Department of Education (DOE) should develop guidelines for public schools regarding recycling and waste reduction activities pursuant to §10.1-1425.9 of the *Code of Virginia*. In developing such guidelines, DOE should consult with school administrators and staff, Department of Environmental Quality staff, local recycling coordinators, the Virginia Recycling Association executive officers, and other stakeholders as necessary.
3. The Department of Environmental Quality should assist the data collection efforts of the solid waste planning units by developing and making available a standard survey collection instrument for businesses and institutions.
4. The Department of Environmental Quality should institute a formal review process of the recycling rate reports from each solid waste planning unit to ensure the accuracy of the reported information. The review process should permit the department to identify unusually high or low reported data and assess the credibility of that information.
5. The Department of Environmental Quality should develop or make available an electronic reporting system for the local recycling rate reports that includes a process for identifying potential data discrepancies.
6. The Department of Environmental Quality should use its recycling workshops to promote practices that have been successful at increasing waste reduction in Virginia and elsewhere.
7. The General Assembly may wish to consider levying a surcharge of $0.25 to $1.00 on the fees imposed by facilities permitted by the State to accept and dispose of municipal solid waste. The General Assembly may also wish to consider dedicating the revenue generated from such a surcharge to waste reduction efforts currently under way and/or new waste reduction efforts.

8. Contingent upon the provision of additional funding dedicated to waste reduction efforts, the General Assembly may wish to consider using the revenue to fund (1) the creation of a State recycling coordinator position organized within the Department of Environmental Quality to assist State entity and local recycling programs and to develop markets for recyclables, (2) public education and outreach efforts to expand existing waste reduction programs and develop new programs, (3) an increase in funding available to solid waste planning units for waste reduction programs, and/or (4) grants that would be available to processors and end users of recyclables to increase the amount of recycling activity occurring in Virginia. With the establishment of a State recycling coordinator position, the General Assembly may wish to consider eliminating the Virginia Recycling Markets Development Council.

9. The General Assembly may wish to direct the Department of Environmental Quality to (1) periodically examine the need to update the current minimum recycling requirements, (2) identify a waste reduction goal for Virginia that establishes a baseline amount of waste the State wishes to dispose of on a per capita basis, and (3) develop strategies that would be needed to implement such a goal. DEQ could report its finding to the General Assembly prior to the 2010 General Assembly Session.

Appendix A

Study Mandate

SENATE JOINT RESOLUTION NO. 361

Directing the Joint Legislative Audit and Review Commission to study waste minimization, reuse, and recycling. Report.

Agreed to by the Senate, February 6, 2007
Agreed to by the House of Delegates, February 16, 2007

WHEREAS, solid waste may be managed through one of three channels: minimization, recycling, or disposal by incineration and landfilling; and

WHEREAS, waste minimization and reuse through recycling and reclamation are highly preferred alternatives to disposal and, according to the Environmental Protection Agency, produce a wide range of benefits for the private sector, such as the reduction of the quantity and toxicity of hazardous and solid waste generation; raw material and product losses; raw material purchase costs; waste management recordkeeping and paperwork burden; waste management costs; workplace accidents and worker exposure; compliance violations; and environmental liability; and

WHEREAS, permitted solid waste management facilities in the Commonwealth received a total of 24,492,185 tons of solid waste during 2005 and, based on current waste generation and disposal rates, the Commonwealth will exhaust existing landfill capacity before 2023 according to the Department of Environmental Quality; and

WHEREAS, only 6.1 percent of the waste delivered to permitted landfill facilities is subsequently diverted from disposal by recycling or mulching; and

WHEREAS, the Commonwealth has mandated that each locality create or participate in a recycling program and administers a total of approximately $1.5 million from the statewide Litter Control and Recycling Fund for such purposes; and

WHEREAS, the Commonwealth has not adopted a long-term plan to reduce waste that incorporates minimization alternatives; and

WHEREAS, current waste reduction programs at the state and local levels face funding shortfalls and are unable to fully execute their missions; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Joint Legislative Audit and Review Commission be directed to study waste minimization, reuse, and recycling.

In conducting its study, the Joint Legislative Audit and Review Commission shall review the success of programs currently employed in Virginia and similarly situated states. The Commission shall further recommend long-term goals for waste minimization and determine the necessary legal and economic prerequisites to achieve those goals.

Technical assistance shall be provided to the Joint Legislative Audit and Review Commission by the Department of Environmental Quality. All agencies of the Commonwealth shall provide assistance to the Joint Legislative Audit and Review Commission for this study, upon request.

The Joint Legislative Audit and Review Commission shall complete its meetings for the first year by November 30, 2007, and for the second year by November 30, 2008, and the chairman shall submit to the Division of Legislative Automated Systems an executive summary of its findings and recommendations no later than the first day of the next Regular Session of the General Assembly for each year. Each executive summary shall state whether the Joint Legislative Audit and Review Commission intends to submit to the General Assembly and the Governor a report of its findings and recommendations for publication as a House or Senate document. The executive summaries and reports shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports and shall be posted on the General Assembly's website.

Appendix B

Research Activities and Methods

Key research activities and methods for this study included

- structured interviews,
- site visits to waste management facilities,
- a survey of local waste management staffs,
- a survey of State agencies, colleges, and universities,
- data collection and analysis,
- document reviews,
- file reviews,
- academic literature reviews, and
- attendance at meetings and conferences.

STRUCTURED INTERVIEWS

JLARC staff conducted structured interviews with staff at the following State entities to better understand the State's role in waste management and waste reduction as well as how agencies coordinate their waste reduction efforts:

- DEQ Environmental Enhancement Division,
- DEQ Waste Division,
- Virginia Department of General Services,
- Virginia Department of Business Assistance,
- Virginia Department of Corrections,
- Virginia Economic Development Partnership,
- Virginia Department of Education,
- Virginia Department of Motor Vehicles,
- University of Virginia,
- Virginia Commonwealth University,
- College of William and Mary,
- Virginia Department of Transportation.

JLARC staff also conducted interviews with staff in 16 localities and regional bodies regarding their waste reduction efforts. The localities and regional bodies are:

- City of Alexandria,
- Appomattox County,
- Botetourt County,
- Caroline County,
- Central Virginia Waste Management Authority,
- Chesterfield County,
- Fairfax County,
- City of Falls Church,
- Floyd County,
- Franklin County,
- Henrico County,
- King George County,
- City of Manassas Park,
- Montgomery Regional Solid Waste Authority,
- Prince William County, and the
- Southeastern Public Service Authority

Interviews were chosen to include programs with high and low reported recycling rates in both urban and rural areas of the State. JLARC staff used the interviews to better understand how localities have responded to the State's recycling mandate, identify challenges to operating successful waste reduction programs, and document best practices that could improve local waste reduction efforts.

SJR 361 directed JLARC to identify successful waste reduction programs in states that are "similarly situated" to Virginia. As such, JLARC staff selected the states that border Virginia: Kentucky, Maryland, North Carolina, Tennessee, and West Virginia. Pennsylvania was also selected because it has a large number of well-known and well-funded waste reduction programs. It also is the only state in the nation that imports more trash than Virginia. Well-known waste reduction programs in other non-border states were also examined, including the bottle deposit law in Michigan, the waste oil program in South Carolina, and variable-rate pricing systems for trash disposal in Minnesota. Waste reduction programs at two military installations in Virginia also were examined.

Because waste is often transported across borders for disposal, other states' laws and waste management practices (for example, disposal bans on certain materials) can affect the amount and content of the waste that is transported and the potential for its disposal, legally and illegally, in Virginia. Certain demographic factors also impact waste management, such as population density and percent metropolitan area. Of states selected for comparison, Michigan and North Carolina most closely resemble Virginia's population density of about 179 people per square mile of land, with Michigan and Pennsylvania being the most similar to Virginia in percent metropolitan area.

Finally, JLARC staff interviewed other stakeholders in waste reduction efforts, such as current and former members of Virginia's Waste Management Board, the chair of the Litter Prevention and Recycling Grant Fund Advisory Board, executive committee members of the Virginia Recycling Association, staff of the Virginia Association of Counties and the Virginia Municipal League, members of the Virginia Recycling Markets Development Council (VRMDC), and staff of recyclables processors and end users.

SITE VISITS TO WASTE MANAGEMENT FACILITIES

JLARC staff visited waste management facilities to better understand how waste moves through the waste management system. Staff toured a materials recovery facility (MRF) in Chester, a waste-to-energy facility in Portsmouth, a compost facility in Chester, and a landfill in Appomattox County.

SURVEY OF LOCAL WASTE REDUCTION PROGRAMS

JLARC staff administered an online survey of waste reduction staff with 153 localities and regional bodies to better understand how local waste reduction programs operate and identify factors that influence the success of those programs. Staff received 96 completed surveys, for a response rate of 63 percent. Local waste reduction staffs were asked to provide information regarding

- the materials collected for recycling;
- the methods used to collect those materials;
- efforts to promote participation in waste reduction programs, including local ordinances, financial incentives, or promotional efforts;
- the strength of markets for the materials collected; and
- the estimated costs of recycling, landfilling, or incinerating MSW.

Local waste management staffs were also asked to assess the level of financial and technical assistance they receive from the State. The 96 localities and multi-locality solid waste planning units that responded to the survey are shown in Figure B-1.

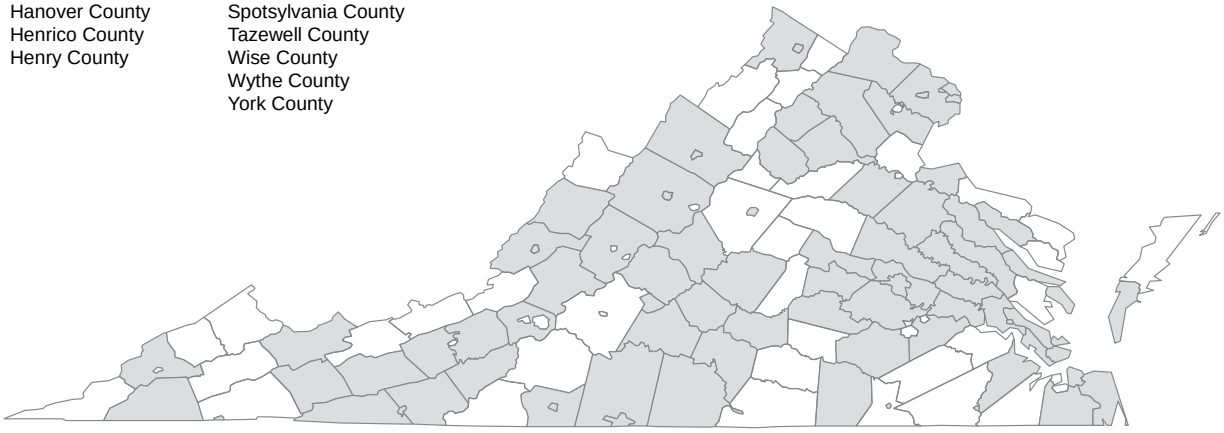
SURVEY OF STATE AGENCIES, COLLEGES, AND UNIVERSITIES

JLARC staff surveyed State agency, legislative agencies, and university staff to better understand if and how State entities comply with the statutory mandate to operate a recycling program and

Figure B-1: Respondents to JLARC Staff Survey of Local Waste Reduction Programs, Summer 2008

Locality or Multi-Locality Solid Waste Planning Unit Responded to Survey

Alleghany County
Amelia County
Amherst County
Appomattox County
Arlington County
Augusta County
Bath County
Botetourt County
Brunswick County
Buckingham County
Campbell County
Caroline County
Carroll County
Charles City County
Charlotte County
Chesterfield County
Culpeper County
Dinwiddie County
Essex County
Fairfax County
Fauquier County
Floyd County
Frederick County
Goochland County
Grayson County
Halifax County
Hanover County
Henrico County
Henry County
Isle of Wight County
James City County
King and Queen County
King George County
King William County
Loudoun County
Madison County
Mathews County
Middlesex County
Montgomery County
Nelson County
New Kent County
Northampton County
Pittsylvania County
Powhatan County
Prince Edward County
Prince George County
Prince William County
Pulaski County
Rappahannock County
Richmond County
Roanoke County
Rockbridge County
Rockingham County
Scott County
Smyth County
Spotsylvania County
Tazewell County
Wise County
Wythe County
York County
City of Alexandria
City of Bristol
City of Charlottesville
City of Chesapeake
City of Covington
City of Danville
City of Emporia
City of Fairfax
City of Falls Church
City of Franklin
City of Galax
City of Hampton
City of Harrisonburg
City of Lynchburg
City of Manassas Park
City of Martinsville
City of Newport News
City of Norfolk
City of Poqouson
City of Richmond
City of Staunton
City of Virginia Beach
City of Williamsburg
City of Winchester
Town of Christiansburg
Central Virginia Waste Management Authority
Crater PDC - Southern Crater Region
Cumberland Plateau Regional Waste Management Authority
Montgomery Regional Solid Waste Authority
New River Resource Authority
Northern Shenandoah Valley Regional Commission
Rappahannock Regional SW Board
Southeastern Public Service Authority
Southside Regional Public Service Authority
Thomas Jefferson Planning District Commission
Virginia Peninsulas Public Service Authority



Source: JLARC staff.

minimize their waste generation. In all, 140 State entities were surveyed and 86 responses were received (61.4 percent). Table B-1 identifies the number of responses by type of entity.

Table B-1: Number of Responses to the JLARC Staff Survey of State Agencies and Institutions of Higher Education, 2008

Type of Entity	Number of Surveys Provided	Number of Responses
State Agencies	86	52
Legislative Agencies	13	13
Colleges and Universities	17	14
Community Colleges	24	7
Total	140	86

Source: JLARC staff survey, summer 2008

State entity staffs were asked to report the materials collected for recycling, the processes used to collect those materials, quality of recyclable markets, and program costs, among other issues. State entity staffs were also asked to assess the level of assistance they have received from DEQ and DGS in implementing their programs.

DATA COLLECTION AND ANALYSIS

JLARC staff collected and analyzed data on locality reported recycling rates and the distribution of Litter Prevention and Recycling grant funds. This data was collected from DEQ.

Analysis of Data in Recycling Rate Reports Submitted by Solid Waste Planning Units (SWPUs)

JLARC staff obtained from DEQ copies of the reported recycling rate data collected from localities in 2004, 2005, 2006, and 2007. Staff also obtained copies of the recycling rate reports submitted by the SWPUs to DEQ for 2007. The data was used to compare reported recycling rates over time. The data was also used to examine potential factors which may help explain difference in reported recycling across the SWPUs, and to identify SWPUs which are particularly high or low in their per capita waste generation, reported recycling rate, and per capita waste disposal.

Litter Prevention and Recycling Grant Funds

JLARC staff obtained from DEQ copies of grant fund distribution data from FY 2002 through FY 2008. The data was compared to the amount that localities reported having spent on their waste reduction programs to assess the level of funding the State provides for these efforts. JLARC staff also used this data to assess

whether any relationships appeared to exist between this funding and recycling rates.

DOCUMENT REVIEWS

JLARC staff reviewed a variety of annual reports produced by DEQ in the past several years, including the annual recycling rate reports, annual solid waste management reports, annual reports on waste tire pile clean-up, annual Office of Pollution Prevention reports, and annual performance and auditing report for non-competitive Litter Prevention and Recycling grants. Additionally, JLARC staff identified and reviewed a number of legislative documents previously produced addressing various waste management and reduction topics, such as "Report of the Commission to Study and Advise Upon the Disposal of Solid Wastes on Beverage Container Legislation" (1976), "Promoting the Procurement and Use of Recycled Products by Agencies of the Commonwealth" (1991), and "Enhancing End-Use Recycling Markets" (1994).

FILE REVIEWS

JLARC staff conducted a review of DEQ's files for SWPUs' solid waste management plans. Staff selected a sample of the 74 plans, concentrating on SWPUs that had reported very high or very low recycling rates. A file review instrument was used to record all correspondence dates, as well as a summary of correspondence.

LITERATURE REVIEWS

JLARC staff conducted literature reviews to supplement findings regarding waste reduction. Such documents include the General Accounting Office's evaluation of the key factors for increasing recycling rates in large urban areas, articles supporting and criticizing recycling efforts and landfill shortage claims, an analysis of factors related to waste generation, and the Minneapolis Federal Reserve Bank's evaluation of recycling.

ATTENDANCE AT MEETINGS AND CONFERENCES

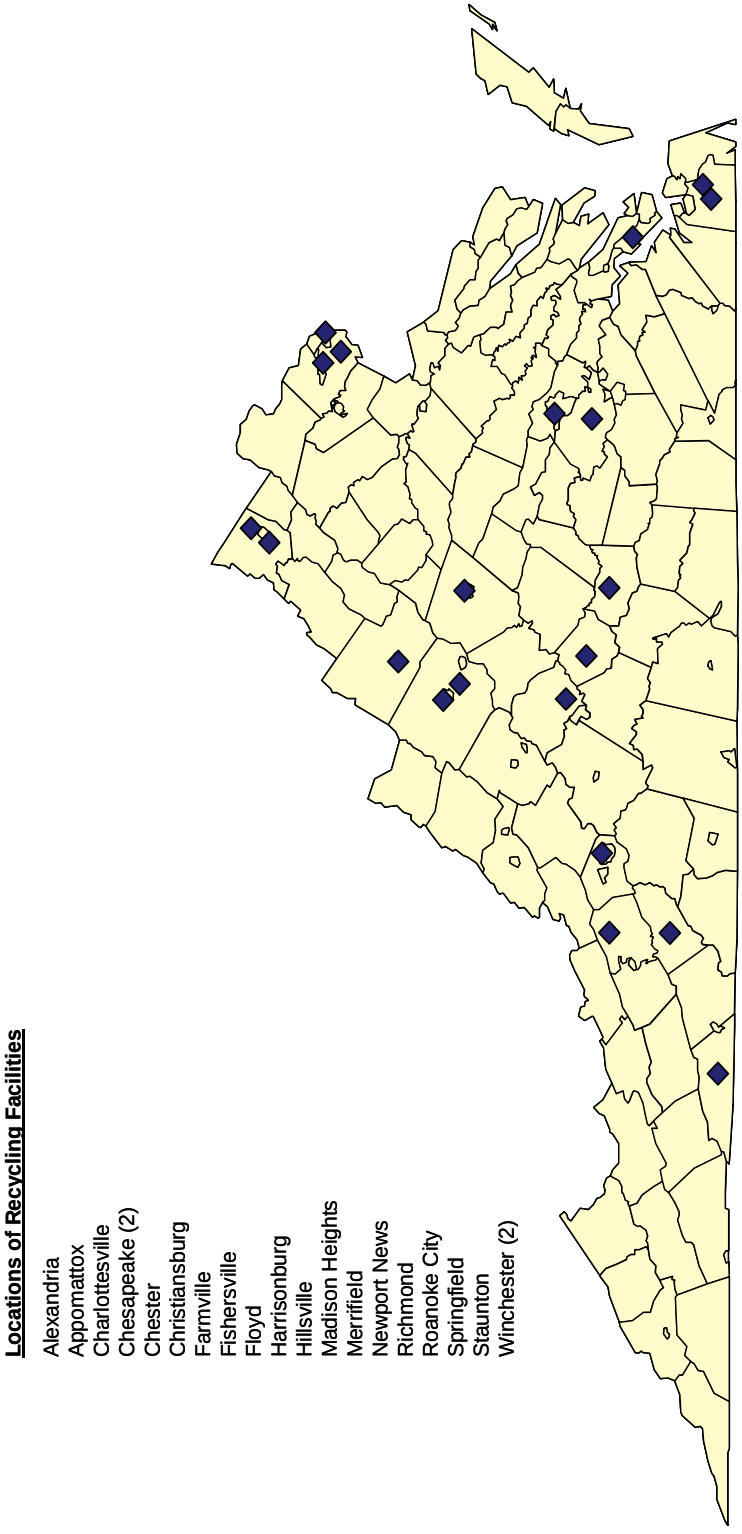
JLARC staff attended the December and March meetings of the Virginia Markets Development Council, a governor-appointed council statutorily charged with assisting localities and others in meeting recycling mandates and with facilitating access to recycling markets for materials collected in the Commonwealth. Staff also attended the November meeting of the Virginia Recycling Association (VRA), as well as the VRA's school recycling workshop in March and their annual conference in May. JLARC staff attended the November 2007 meeting of the Virginia Council for Litter Pre-

vention and Recycling, a statewide council of local litter prevention coordinators. Staff also attended a local workshop presented by DEQ, that focused on assisting SWPUs with completing the recycling rate reports, through accurately identifying and calculating the amount of material generated, recycled, and disposed of annually. JLARC staff also attended a the June meeting the Plastic Bag Advisory Group held in Windsor.

JLARC staff have attended three EPA seminars provided through the Internet regarding recycling topics. These seminars addressed source reduction efforts aimed to reduce packaging practices, the recycling of construction and demolition debris, and the disposal of compact fluorescent light bulbs.

Appendix C

Locations of Recycling Facilities in Virginia



Source: JLARC staff analysis of information provided by DEQ, September 2008.

Appendix D

Description of Recyclable Materials

Recyclable Material	Description
Paper	White and mixed office paper, newspapers and newspaper inserts, cardboard packaging, paperboard, mixed paper, magazines, phone books, and other paper materials
Metal	Aluminum and steel cans, ferrous and non-ferrous metals, white goods, and metal siding
Yard waste	Grass clippings, leaves, and small woody trimmings from trees and bushes
Wood waste	Tree branches, stumps, construction wood waste, and wood pallets
Commingled recyclables	Any recyclable material collected in a single stream at the curbside or drop-off sites
Plastics	
1 PET	PET, PETE, Polyethylene Terephthalate. Examples include beverage bottles.
2 HDPE	HDPE, High Density Polyethylene; Examples include milk, juice, shampoo and detergent bottles; grocery bags
3 PVC	PVC, Polyvinyl Chloride; Examples include rigid and flexible packaging such as blister packs, shrink wrap film
4 LDPE	LDPE, Low Density Polyethylene; Examples include dry cleaning, newspaper, and garbage bags; shrink wrap and stretch film; container lids
5 PP	PP, Polypropylene; Examples include yogurt, margarine containers, medicine bottles
6 PS	PS, Polystyrene; Examples include food service items such as cups, plates; rigid food containers such as yogurt
7 OTHER	OTHER, not 1-6 or a combination; Examples include some juice and catsup bottles; custom packaging

Source: Information from DEQ, and the American Chemistry Council-Plastics Division, “Resin Identification Codes.”

Appendix E

Recyclable Materials and Strength of Markets

Material	Reported Tons Recycled in Virginia (2007)	How Is the Material Recycled or Reused?	Strength of Markets[a]			
			Localities		Regional Bodies	
			Market Strength Excellent	Market Strength Fair	Market Strength Excellent	Market Strength Fair
Paper	917,852	Paper	55.9%	37.3%	57.1%	42.9%
Metal	762,334	Drink containers Tin cans				
Copper			83.0	13.2	87.5	12.5
Aluminum			77.8	19.0	87.5	12.5
Steel			75.0	21.9	77.8	22.2
Yard Waste	567,595	Compost Mulch	34.1	27.3	25.0	50.0
Waste Wood	232,092	Compost Mulch	--	--	--	--
Tires	66,384	Alternate landfill cover	21.8	30.9	0.0	22.2
Motor Oil	52,886	Fuel petroleum product Vehicle oil	--	--	--	--
Plastics	48,450	Fiber Structural molding Drink containers Plastic "lumber"				
Plastics 1-2			39.1	37.0	50.0	33.3
Plastics 3-7			21.4	25.0	0.0	33.3
Glass	44,268	Drink containers Construction material				
Clear glass			8.7	17.4	0.0	0.0
Colored glass			8.2	12.2	0.0	0.0
Textiles	24,684		--	--	--	--
Batteries	17,163	Metal	--	--	--	--
Automobiles	8,241	Metal Plastic Tires	--	--	--	--
Oil Filters	4,427	Steel	--	--	--	--
Antifreeze	3,685	Antifreeze	--	--	--	--
Electronics	3,081	Metal Plastic	--	--	--	--
Cardboard	--	Paper	62.5	26.8	57.1	42.9
Construc-tion Waste	--	Alternate landfill cover	--	--	--	--
Debris Waste	--	Alternate landfill cover	--	--	--	--
Demolition Waste	--	Alternate landfill cover	--	--	--	--
Food Waste	--	Compost	--	--	--	--
Paint	--	Paint	--	--	--	--

[a] JLARC staff survey of localities and regional bodies asked respondents to rate the strength of markets for various materials.

Source: JLARC staff interviews, JLARC staff survey of localities (summer 2008), data collection, literature reviews, and analysis.

Appendix F

Current Legal Requirements and Goals for Waste Management in the United States and Virginia

Legal Requirement	Goal
Federal Level	
Federal agencies must purchase materials with a certain amount of recycled content, when possible	Encourage states to adopt integrated waste management principals in their solid waste planning that incorporate all aspects of handling waste, including source reduction, recycling, and landfilling and combustion
	Work with states, industry, businesses, and others to conserve natural resources and energy by reducing waste, increasing recycling and reuse and using more products made from such materials, and using fewer toxic chemicals
	Encourage state governments, localities, households, industry, etc. to recycle 35 percent of municipal solid waste, targeting paper, food scraps, yard trimmings, and container packaging
	Encourage source reduction to prevent waste creation through better management of raw materials and product design
	Encourage reduction in the amount of waste generated to 4.4 pounds per day per person
State Level	
State agencies, agencies of the General Assembly, and universities must implement procedures for collection and storage of recyclable materials, disposal of such materials, reduction of waste materials, and use of recycled material	Encourage removal of barriers and provide incentives and assistance to reduce waste, reduce or eliminate waste at the source, recycle waste that is created, and treat all other waste in an environmentally sound manner
Department of Business Assistance must encourage and promote the establishment of appropriate recycling industries in the Commonwealth	
Department of Transportation must conduct recycling research projects in highway construction and maintenance and periodically review and revise its bid procedures to encourage the use of recycled products	
Any retailer of lead acid batteries must accept lead acid batteries returned by a customer equal to the number of lead acid batteries sold to the customer and post a sign in their place of business indicating this requirement and that they accept such batteries for disposal	
Department of Environmental Quality (DEQ) shall expend at least 90 percent of the funds deposited into the litter tax fund	
DEQ shall develop and implement a plan for management and transportation of waste tires in Virginia	
State statute requires that localities must maintain a 25% recycling rate, unless: (1) the locality has a population density less than 100 persons per square mile or (2) an unemployment rate 50% above the State unemployment rate. If one of those two conditions is met, the locality must maintain a 15% recycling rate	

Legal Requirement	Goal
Localities must submit a solid waste management plan to DEQ	
Localities must report to DEQ the amount of recycled material and waste generated and disposed in their jurisdiction	
State entities shall purchase only recycled paper where applicable and all new office equipment that uses paper must be able to process recycled paper (Executive Order 48, 2007)	
Local and Solid Waste Planning Unit Level	
The *Code of Virginia* provides localities with the authority to direct the flow and disposal of waste to the landfill of their choice	Encourage households to recycle by providing curbside pickup of certain materials and drop off centers
The *Code* provides localities with the authority to require any person to separate solid waste for collection and recycling, subject to civil penalties	
The *Code* provides localities with the authority to require businesses to report on their recycling activities	

Note: What is legally required versus a goal may vary by locality.

Source: JLARC staff review of EPA, DEQ, and locality documents, and interviews.

Appendix G

Waste Generation, Recycling, and Disposal at the Local Level in Virginia

Virginia statutes and the Virginia Department of Environmental Quality (DEQ) give substantial attention to the recycling rates achieved by localities. However, the goal of waste reduction efforts is to minimize the amount of waste that goes to landfills or combustion facilities. To more fully consider local performance in keeping waste out of landfills, there is a need to take more into account than recycling rates. Specifically, the amount of waste per capita that is generated and that is disposed are measures which aid in assessing the relative level of citizen, business, and governmental effectiveness in reducing or minimizing the volume of disposed waste.

The following provides an analysis of DEQ waste data to assess patterns in the waste that is generated, recycled, and disposed locally in Virginia. The analysis is based on municipal solid waste (MSW) data from calendar year 2007. The data are reported by 74 solid waste planning units (SWPUs) which serve 325 Virginia counties, cities and towns. In the analysis, the recycling tonnage and recycling rates used are "base" amounts, prior to DEQ inclusion of recycling credits. (SWPUs may receive recycling credits for waste that is recycled that is not MSW.)

The analysis shows that some of the planning units with the highest reported recycling rates in the State still also have some of the highest waste disposal levels, because a high volume of waste per capita is generated. Also, some of the planning units with low recycling rates do not, according to the reported data, generate much waste per capita to begin with, and thus have low reported waste disposal rates.

WASTE GENERATION IN VIRGINIA'S SOLID WASTE PLANNING UNITS

SWPUs reported about 8.79 million tons of MSW generated within Virginia localities in 2007, or an average of about 1.14 tons per capita. There are substantial differences in the reported amounts of waste generated per capita between SWPUs. Table G-1 shows the ten units with the most and least reported waste generated per capita in 2007.

Table G-1: Solid Waste Planning Units With the Most and Least Reported Waste Generated on a Per Capita Basis (2007 Data)

Highest Reported Rates		Lowest Reported Rates	
Solid Waste Planning Unit	Per Capita Waste Generated (Tons Per Year)	Solid Waste Planning Unit	Per Capita Waste Generated (Tons Per Year)
Lynchburg	2.90	Manassas Park City	0.46
Fairfax City	2.01	Caroline	0.54
Manassas City	2.00	Buckingham	0.65
Nottoway	1.82	Patrick	0.68
Fauquier	1.75	Amelia	0.68
Bristol	1.62	Scott	0.69
Virginia Peninsulas Public Svs Authority	1.60	Carroll-Grayson-Galax	0.71
Tazewell	1.56	Madison	0.73
Bedford City	1.54	Craig	0.73
Alexandria	1.52	Pittsylvania	0.73

Source: JLARC staff analysis of data reported to DEQ's Office of Litter Prevention and Recycling.

Some of the SWPUs on the list of highest and lowest waste generators may reflect some unusual location situations, which may create some difficulties in determining the source of the waste. For example, based on the reported data, Manassas City ranks third highest, while nearby Manassas Park ranks as the lowest.

BASE RECYCLING RATES OF SOLID WASTE PLANNING UNITS

Data reported by the SWPUs for 2007 indicates that of the 8.79 million tons of MSW generated, about 2.90 million tons was not disposed as waste. Thus, on average, about 33 percent of the generated waste was recycled or otherwise applied in a way that avoided disposal.

As with waste generation, there was substantial variation across SWPUs in the percent of waste generated that was not disposed. Table G-2 shows the SWPUs with the highest and lowest recycling (or disposal-prevention) rates, based on the 2007 data.

Within data availability constraints, JLARC staff examined factors that might be associated with recycling rates. It was hypothesized, for example, that the population density of a SWPU might be associated with recycling rates, as presumably recycling activity levels are increased where curbside collection is feasible. The greater the extent to which households are concentrated in an area, it might be expected that curbside collection is more likely and recycling rates might increase.

Table G-2: SWPUs With the Highest and Lowest Reported Recycling Rates (2007 Base Recycling Rates)

Highest Reported Rates		Lowest Reported Rates	
Solid Waste Planning Unit	**Recycling Rate (%)**	**Solid Waste Planning Unit**	**Recycling Rate (%)**
Vienna	52.6%	Botetourt	6.7%
Falls Church	51.0	Manassas Park City	7.8
Vinton	51.0	Floyd	9.5
Bedford City	47.0	Brunswick	10.4
Central Virginia Waste Mgmt Authority	45.3	King George	10.8
Rappahannock Regional Solid Waste Mgmt Board	44.8	Lunenburg	11.5
Roanoke City	42.8	Lee	12.2
Virginia Peninsulas Public Svs Authority	39.9	Southside Regional Public Svs Authority	13.4
Herndon	39.7	Buckingham	14.1
Wise County-City of Norton	39.7	Bath	15.1

Source: JLARC staff analysis of data reported to DEQ's Office of Litter Prevention and Recycling.

Another factor considered was income levels. Literature in the recycling field has indicated that income levels can be associated with higher recycling levels. Higher income residents may be more informed about recycling opportunities or may be better positioned to access recycling collection services. Thus, it was hypothesized that higher income levels may be associated with higher recycling rates.

Another hypothesis was that whether an SWPU managed its waste independently or as part of a regional body would affect its recycling rate. Nineteen SWPUs provide services to certain counties, cities, and towns that have chosen to regionalize their waste management. These SWPUs may reap some economy of scale or other beneficial advantages in achieving a higher recycling rate.

Another factor considered in the analysis was the quantity of waste generated. The quantity of waste generated per capita might be associated with more recycling. Relatively small streams of waste that are not captured by recycling count more heavily if the total volume of waste is low. It is also possible that a higher level of recycling is facilitated by the type or mix of waste generated in SWPUs with high per capita quantities of waste.

The results of the analysis revealed two factors—population density and regionalization of waste management—were positively associated with reported 2007 recycling rates (Table G-3). These factors appear to explain about 34 percent of the variation in the recycling rates reported that year.

Table G-3: Regression Model Predicting 2007 Recycling Rates

	Parameter Estimate	Standard Error	Standardized Estimate
Constant	.08293	.03384	0
Log Population Density	.08045	.01342	.5872
Regional SWPU	.05232	.02377	.2156

Note: Log Population Density = logarithmic transformation of population density; Regional SWPU = 1 if the SWPU includes more than one locality, 0 otherwise; R-Square = .34. n = 74 SWPUs. The full population of SWPUs was used to estimate the regression model. Therefore, resulting sample statistics (such as levels of significance) were not meaningful in this case.

Source: JLARC staff analysis of data reported to DEQ by SWPUs.

The regression model can be applied to estimate the recycling rate that would result in each SWPU if the recycling effort of that SWPU achieved a level of recycling which was "typical" statewide in 2007. Table G-4 shows the high and low end of these results. The table indicates that in 2007, some SWPUs with relatively high population density could, with an average level of performance, achieve recycling rates of 35 percent and higher. On the other hand, if operating at typical statewide performance levels, some low population density SWPUs are predicted to achieve recycling rates of about 14 to 22 percent.

Table G-4: Some SWPUs Have Characteristics More Conducive to Greater Recycling Rates Than Others

More Conducive Characteristics		Less Conducive Characteristics	
Solid Waste Planning Unit	Recycling Rate "Predicted" by Model Given Characteristics (%)	Solid Waste Planning Unit	Recycling Rate "Predicted" by Model Given Characteristics (%)
Alexandria	40.1%	Highland	14.4%
Arlington	39.6	Bath	16.1
Falls Church	38.5	Craig	18.0
Manassas Park City	38.4	Rappahannock County	19.8
Herndon	38.2	Buckingham	20.0
Manassas	37.0	Lunenburg	20.3
Fairfax City	37.0	Brunswick	20.5
Vienna	36.7	Amelia	20.8
Newport News	35.9	Floyd	21.1
Harrisonburg	35.7	Patrick	21.2

Source: JLARC staff analysis of 2007 data reported by SWPUs to DEQ and population density data. "Predicted" values are based on regression model results using the factors (characteristics) of (1) population density, and (2) whether or not the SWPU serves more than one city or county.

Table G-5 shows the SWPUs with reported recycling rates in 2007 which were the most above and below the rate achieved if their recycling performance had been at the typical statewide achievement level given their characteristics. Some SWPUs with low "predicted" rates report rates to DEQ substantially above those low rates. For example, given Appomattox County's characteristics, the predicted recycling rate was 21.5 percent, but the reported data indicate a

rate more than 1.5 times as high. Based on the reported data, two SWPUs with high predicted recycling rates (because of their conducive characteristics) not only met but substantially exceeded their high predicted rates. Falls Church and Vienna were in the top ten for having the highest predicted rates and for most exceeding their predicted rate.

Table G-5: SWPUs With Reported Recycling Rates Most Above and Below Typical Achievement Levels

Most Above Typical Level		Most Below Typical Level	
Solid Waste Planning Unit	Percentage Points Above	Solid Waste Planning Unit	Percentage Points Below
Vienna	15.9	Manassas Park City	30.7
Bedford City	15.2	Alexandria	18.3
Vinton	15.1	Botetourt	16.0
Bedford County	13.5	King George	14.3
Patrick	12.8	Southside Regional Public Svs Authority	13.2
Appomattox	12.5	Floyd	11.7
Falls Church	12.5	Southern Crater Region	10.4
Cumberland Plateau Regional Waste Mgmt Authority	12.2	Lee	10.1
Central Virginia Waste Mgmt Authority	10.6	Brunswick	10.1
Wise / City of Norton	9.8	Newport News	9.9

Source: JLARC staff analysis of 2007 data reported to DEQ.

TOTAL SOLID WASTE DISPOSED PER CAPITA

The solid waste that is disposed per capita in a SWPU provides an indication of the extent to which those served by the SWPU are generating waste which is not recycled, but rather is disposed in a landfill. Table G-6 shows the SWPUs with the most and least solid waste disposed per capita, based on data reported by the SWPUs to DEQ. As can be seen in the table, some SWPUs report waste disposal amounts per capita that are several times more than the SWPUs reporting the lowest amounts.

CONCLUSION

To assess the extent of waste reduction, the solid waste generated per capita and the solid waste disposed per capita are measures in addition to the recycling rate which should be taken into account. It is possible for a SWPU to have a very high recycling rate, yet still be very high in reported tons of waste per capita due to a high reported amount of waste generated per-capita. The Lynchburg

Table G-6: SWPUs With the Most and Least Solid Waste Disposed Per Capita (2007 Data)

Highest Reported Rates		Lowest Reported Rates	
Solid Waste Planning Unit	Per Capita Waste Disposed (Tons Per Year)	Solid Waste Planning Unit	Per Capita Waste Disposed (Tons Per Year)
Lynchburg	1.86	Vienna	0.35
Nottoway	1.37	Caroline	0.41
Fauquier	1.35	Manassas Park City	0.43
Tazewell	1.25	Patrick	0.45
Manassas City	1.25	Central Virginia Waste Mgmt Authority	0.46
Fairfax City	1.22	Danville	0.52
Alexandria	1.19	Madison	0.52
Brunswick	1.14	Appomattox	0.53
Bristol	1.11	Amelia	0.53
Rappahannock County	1.05	Pittsylvania	0.54

Source: JLARC staff analysis of data reported to DEQ.

SWPU, for example, falls into this category. On the other hand, it is also possible for a SWPU to have a very low recycling rate, yet still be very low in reported tons of waste disposed per capita, if the reported amount of waste generated per capita within the SWPU is very low.

Using the 2007 data, Table G-7 shows the SWPUs grouped into nine categories, based on whether the SWPU is relatively high, medium, or low in its recycling rate and in its solid waste disposal per capita. This type of analysis provides some opportunities for further assessing the accuracy of the data reported to DEQ as well as determining the SWPUs with the most need for reducing their generation of wastes or for enhancing their recycling activity.

For example, for the six SWPUs in the "high recycling, high disposal" category (upper right corner of the table), there is a need to consider what factors—whether data reporting problems or high waste generation factors—cause this result. If it is due to a high generation of waste, are there any opportunities to reduce the amount generated?

For the group of SWPUs in the category of "low recycling and low disposal" (lower left corner of table), the accuracy of the data for the total amount of waste generated per capita also needs to be examined. If the data are accurate, it may be that some of these localities merit some credit for having low waste generation rates, even though their recycling rates are low.

Also, SWPUs in the "low recycling, high disposal" category (lower right corner of table) may be prime candidates for an increase in the priority given to waste reduction. Reductions in the amount of waste disposed could be achieved in these SWPUs by either reducing per capita waste produced or increasing the extent of recycling.

Table G-7: SWPUs Sorted by Recycling Rates and Disposal Levels (2007 Data)

	LOW DISPOSAL	MEDIUM DISPOSAL	HIGH DISPOSAL
	Vienna	Arlington	Lynchburg
	Falls Church	Herndon	Manassas
HIGH RECYCLING	Vinton	Rappahannock Regional Solid Waste Mgmt Board	Fairfax County
	Central Virginia Waste Mgmt Authority	Bedford City	Fairfax City
	Roanoke City	Northern Shenandoah Valley Regional Commission	Virginia Peninsulas Public Service Authority
		Wise County / City of Norton	
		Cumberland Plateau Regional Waste Mgmt Authority	
		Bedford County	
	Danville	Newport News	Harrisonburg
	Roanoke County	Southeast	Bristol
	Spotsylvania	Salem	Martinsville City-Henry County
	Mount Rodgers Planning District Commission	Prince William	Augusta Regional
MEDIUM RECYCLING	Rockbridge-Lexington-Buena Vista	Loudoun	Montgomery
	Culpeper	Thomas Jefferson Planning District Commission	Gloucester
	Rockingham	Alleghany Highlands	Campbell
	Franklin County	Amherst	
	Pittsylvania		
	Appomattox		
	Madison		
	Patrick		
	Manassas Park City	Northern Neck Planning District Commission	Alexandria
	Carroll-Grayson-Galax	Prince Edward-Cumberland	New River
	Orange	King George	Southside
	Louisa	Botetourt	Southern Crater Region
LOW RECYCLING	Caroline	Lee	Fauquier
	Scott	Floyd	Accomack
	Amelia	Highland	Tazewell
	Buckingham		Northampton
	Craig		Nottoway
			Brunswick
			Lunenburg
			Rappahannock County
			Bath

Note: "High" recycling SWPUs have reported recycling rates of 35 percent and above, medium recycling is 25 up to 35 percent, and low recycling is below 25 percent. Low disposal SWPUs have disposal levels of less than 0.66 tons per capita, medium disposal is 0.66 to less than 0.88 tons per capita, and high disposal is 0.88 tons per capita or more.

Source: JLARC staff analysis of data reported by 74 SWPUs to DEQ for 2007.

Appendix H

Local Spending for Waste Reduction in Selected Other States

State	Annual State Grant Funding Dedicated to Waste Reduction	Waste Reduction Spending by Localities	Average Local Spending Per Capita[i]
Maryland	$0.2 million	Unknown[a]	n.a.
Virginia	**$0.6 million**	$48.0 million[b]	$6.20
North Carolina	$0.8 million	$60.0 million[c]	$6.80
West Virginia	$1.4 million	Unknown[d]	n.a.
Kentucky	$1.5 million	Unknown[e]	n.a.
South Carolina	$4.8 million	$22.6 million[f]	$5.30
Tennessee	$6.9 million	More Than the State[g]	n.a.
Pennsylvania	$44.0 million	More Than the State[h]	n.a.

[a] Maryland Department of the Environment staff stated that Maryland does not maintain such information.
[b] JLARC staff survey of local recycling programs.
[c] Information provided by North Carolina Department of Pollution Prevention and Environmental Assistance. Cost figure includes recycling collection through curbside or drop-off.
[d] West Virginia Solid Waste Management Board staff said that West Virginia has no reporting requirements for recycling amounts or amounts spent. While highly speculative, staff said that the state likely spends more on recycling than the localities.
[e] Kentucky Division of Waste Management staff stated that Kentucky does not maintain such information.
[f] South Carolina Department of Health and Environmental Control (DHEC) staff stated that this is the minimum amount spent. The figure represents spending by 40 of the 46 counties, but does not include any spending by cities or towns. DHEC staff stated that the $22.6 million figure represents the largest portion of recycling spending, but were unable to identify the exact size of the portion.
[g] Tennessee Department of Environment and Conservation staff were able to provide a figure for locality spending on all waste management, but not a specific figure for recycling. Staff indicated that local spending would be substantially more than what was spent by Tennessee.
[h] According to Pennsylvania Department of Environmental Protection (DEP) staff, the municipalities spend substantially more than the State. DEP staff provided data for 11 municipalities indicating $20.3 million in local program spending.
[i] Virginia 2007 population can be found at Weldon Cooper Center for Public Service, Demographics and Workforce, Total Population Estimates for Virginia's Counties and Cities. North Carolina and South Carolina 2006 population data can be found at U.S. Census Bureau, *Statistical Abstract of the United States: 2008*, Table 12, p. 17

Note: n.a., not applicable.

Source: JLARC staff interviews, September-October 2008.

Appendix

Improperly Disposed Used Motor Oil Estimates

U.S. EPA indicates that one gallon of used oil has the potential to contaminate up to one million gallons of fresh water if the oil is improperly disposed by pouring it on the ground or down a drain. The used oil can contain toxins and heavy metals. However, quantifying the extent of the problem of improperly disposed used motor oil is complicated because it requires making tenuous assumptions about individuals' behavior. In the absence of hard data regarding individuals' used oil disposal habits, assumptions about this behavior can lead to widely varying estimates of the amount of used oil improperly disposed.

Two of three studies done within the past ten years which address the extent of improper disposal provide quantified estimates of the amount of used oil that is improperly disposed. In 1999, the Northern Virginia Planning District Commission (NVPDC) used models that assumed between 70 percent and 85 percent of DIY oil changers improperly dispose of their used oil. This assumption was based on contacts of other states which had information on recycling rates among DIY oil changers. Based on that assumption, these models estimated that between 3.3 and 4.4 million gallons of used motor oil are improperly disposed of annually in Virginia. In 2005, the U.S. Department of Energy (U.S. DOE) used similar assumptions—80 percent of DIY oil changers improperly dispose of their used motor oil—to estimate that 348 million gallons of used motor oil are improperly disposed annually in the U.S. DOE's report assumed that DIY improper disposal levels were still similar to those founding a 1997 study, noting that "it is possible that the DIY consumer has changed his practices and recycles more of his oil than in 1997 but there are no hard statistics to support that at a national level." Extrapolating DOE's results to Virginia indicates that between 8.7 and 9.5 million gallons of used motor oil are improperly disposed annually in the Commonwealth.

The third study, conducted by the U.S. Bureau of Transportation Statistics (U.S. BTS) in 2002, considers only the key assumption of how many people perform their own oil changes, and how many of those DIY oil changers improperly dispose of their used oil. U.S. BTS randomly sampled 1,000 households and then performed a telephone survey. Their results indicated that 43 million Americans change their own oil, or 14 percent of the population. Further, they found that one out of every 20 DIY oil changers improperly disposes of her used oil, or five percent of DIY oil changers.

Although the U.S. BTS study does not go as far as to estimate the amount of used oil improperly disposed of, its results suggest that the volume of used motor oil that is improperly disposed may be far less than is assumed in either the NVPDC study or the U.S. DOE study. If it is assumed that each DIY oil changer disposes of approximately 6 gallons of oil each year, then extrapolating from the U.S. BTS study results, Virginia's DIY oil changers are improperly disposing of approximately 323,000 gallons of used motor oil each year, or far less improper disposal than suggested by the other studies.

The U.S. BTS study relied on a telephone survey where individuals self-reported their behavior. This could lead to an underestimate of the number of individuals who improperly dispose of their oil, as some individuals may misrepresent how they handle their used motor oil. While the conclusions one can draw from the U.S. BTS study may be unrealistically low, the results of both the NVPDC and the U.S. DOE study may be unrealistically high. Without accurate data regarding individuals' motor oil disposal behavior, the estimates produced by models of oil disposal behavior will continue to produce uncertain and widely ranging estimates.

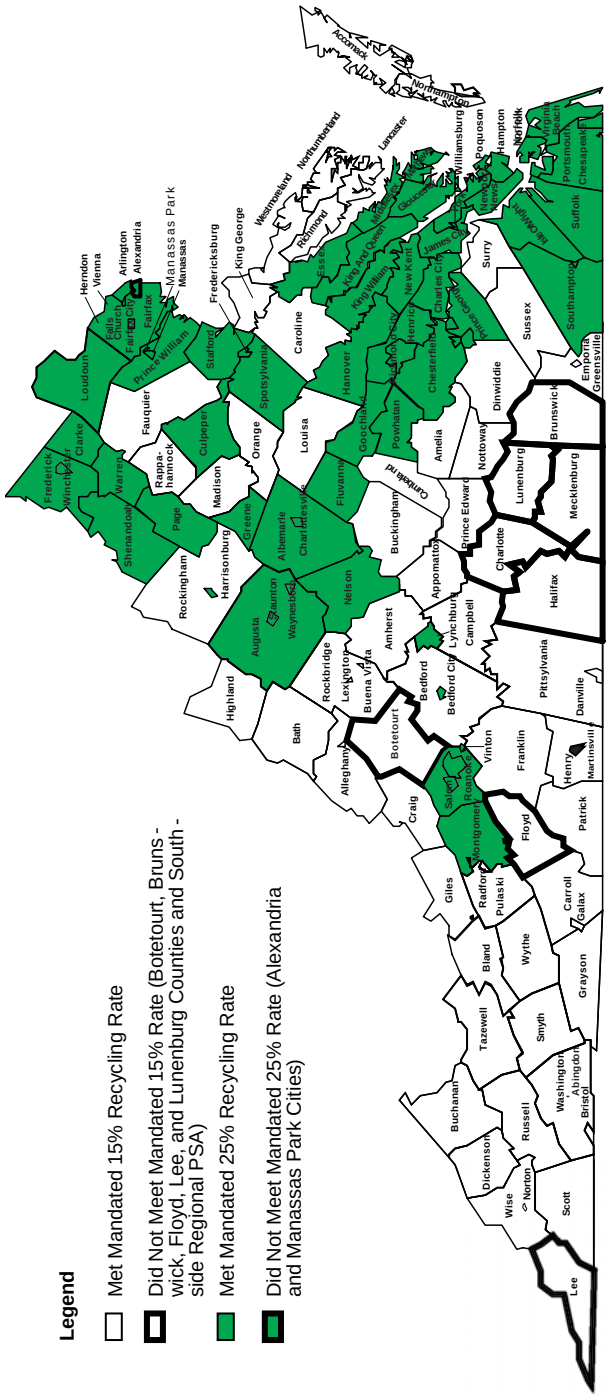
Table I-1: Estimates of Improperly Disposed Used Oil Are Uncertain and Widely Ranging

Study	Year	Description	JLARC Staff Analysis
Northern Virginia Planning District Commission (NVPDC)	1999	Uses several different methodologies to estimate the amount of oil improperly disposed. Finds approximately 3.3 to 4.4 million gallons of used motor oil were improperly disposed of in Virginia in 1997.	This study calculates its estimates by assuming that between 14 and 17 out of every 20 DIY oil changers improperly dispose of their used motor oil.
U.S. Bureau of Transportation Statistics (U.S. BTS)	2002	Conducts a phone survey of a random sample of Americans regarding their oil change habits, and projects the results on the population. Finds approximately 14 percent of Americans are DIYers, and 0.76 percent of Americans are DIYers who improperly dispose of their used motor oil.	Applying these percentages to Virginia would indicate that 1.1 million Virginians are DIYers, and 58,520 of those DIYers improperly dispose of their used motor oil. This study indicates that one out of every 20 DIY oil changers improperly disposes of their used oil.
U.S. Department of Energy (U.S. DOE)	2006	Finds approximately 348 million gallons of used oil were improperly disposed in the U.S. in 2004.	Projecting this finding to Virginia would indicate that between 8.7 and 9.5 million gallons of used motor oil were improperly disposed of in the Commonwealth. This study assumes that 16 out of every 20 DIY oil changers improperly disposes of their used motor oil.

Source: JLARC staff review and analysis of studies.

Appendix **J**

Mandated Recycling Rates for Solid Waste Planning Units (CY 2007)



Members of Regional Solid Waste Planning Units

- Northern Shenandoah Valley Regional Commission (Clarke, Frederick, Shenandoah, Warren, Page; City of Winchester)
- Thomas Jefferson Planning District Commission (Albemarle, Fluvanna, Greene, Nelson; City of Charlottesville)
- Augusta-Staunton-Waynesboro
- Rockbridge-Lexington-Buena Vista
- Alleghany Highlands (Alleghany; City of Covington)
- New River Resource Authority (Pulaski, Giles; City of Radford)
- Mount Rogers Planning District Commission (Bland, Smyth, Washington, Wythe)
- Montgomery County Regional Solid Waste Authority (Montgomery; Towns of Blacksburg and Christiansburg)
- Wise County-City of Norton
- Cumberland Plateau Regional Waste Management Authority (Buchanan, Dickenson, Russell)
- Carroll-Grayson-Galax
- Southside Regional Public Service Authority (Charlotte, Halifax, Mecklenburg)
- Southern Crater Region (Dinwiddie, Greensville, Surry, Sussex; City of Emporia)
- Martinsville City-Henry County
- Prince Edward-Cumberland
- Rappahannock Regional Solid Waste Management Board (Stafford; City of Fredericksburg)
- Northern Neck Planning District Commission (Lancaster, Northumberland, Richmond, Westmoreland)
- Central Virginia Waste Management Authority (Charles City, Chesterfield, Goochland, Hanover, Henrico, New Kent, Powhatan, Prince George; Cities of Colonial Heights, Hopewell, Petersburg, Richmond)
- Virginia Peninsulas Public Service Authority (Essex, James City, King & Queen, King William, Mathews, Middlesex, York; Cities of Hampton, Poquoson, Williamsburg)
- Southeastern Public Service Authority (Isle of Wight, Southampton; Cities of Chesapeake, Franklin, Norfolk, Portsmouth, Suffolk, Virginia Beach)

Appendix K

Agency Responses

As a part of the extensive validation process, State agencies and other entities involved in a JLARC assessment are given the opportunity to comment on an exposure draft of the report. Appropriate technical corrections resulting from comments provided by these entities have been made in this version of the report. This appendix includes a written response from the Department of Environmental Quality. In addition, the Virginia Recycling Association submitted written comments on the exposure draft.

SEP 02 2008

COMMONWEALTH of VIRGINIA

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September 2, 2008

Philip A. Leone, Director
Joint Legislative Audit and Review Commission
General Assembly Building, Suite 1100
Capitol Square
Richmond, Virginia 23219

Dear Mr. Leone,

Pursuant to your letter of August 22, 2008, this is the Virginia Department of Environmental Quality's written response to JLARC's Report regarding Waste Reduction Efforts in Virginia. As indicated in our response of August 28, 2008, DEQ appreciates the work that the team of JLARC staff put into the study and your recognition of the limited resources available to DEQ and localities with which to address the waste minimization goals and objectives of the Commonwealth.

In addition to the technical revisions and changes recommended by DEQ on August 28, 2008, we have some additional comments for your consideration. As confirmed above and throughout the JLARC report, DEQ has limited resources available to administer the Commonwealth's waste reduction objectives. DEQ would like to thank JLARC for its impartial analysis of the considerable efforts already underway in the areas of waste reduction and recycling, and for its recommendations for improving our record keeping methods, data analysis and planning.

Although the JLARC report acknowledges DEQ's limited resources, it also includes several recommendations that will require an additional allocation of resources if the recommendations are to be fully implemented. While the report does include a recommendation (# 7) for creating an additional source of funding for waste reduction activities, it remains unclear whether the other recommendations in the report could be accomplished if more funding were not provided.

Additionally, Recommendation #9 in the JLARC report suggests that Virginia's waste reduction goals should be evaluated on a statewide per capita basis. DEQ is concerned that the use of a per capita method in other states appears to have created even greater challenges in achieving the waste reduction goals of those states. In particular, as the JLARC report highlights, it is our understanding that North Carolina's use of a per capita method later resulted in its decision to stop reporting a recycling rate altogether. We encourage the Commission to exercise caution when considering the per capita method of evaluation because it is unclear that method will provide any significant benefits beyond the method established by the General Assembly in 1989. As the report states, even with the considerable resource constraints the JLARC staff identified, Virginia currently has the second highest recycling rate in this region and our rate already exceeds the national average rate.

Thank you for the opportunity to provide this formal response. We look forward to the presentation of your report to the Commission on September 8, 2008.

Sincerely,

David K. Paylor

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Midlothian, VA 23113
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1-804-302-4231

The VRA is a 501 (c)(3) non-profit and strives to educate and promote effective recycling and waste reduction methods.

September 2, 2008

Mr. Philip A. Leone, Director
Joint Legislative Audit and Review Commission
General Assembly Building, Suite 1100
Capitol Square
Richmond, VA 23219

Dear Mr. Leone:

Thank you for the opportunity to review the exposure draft entitled *Review of Virginia's Waste Reduction Efforts* in response to Senate Joint Resolution 361 (2007). It has been a pleasure to work with Eric Messick, Chief Legislative Analyst and Project Leader, and we greatly appreciate the staff's effort to examine and report on such a broad issue.

The Virginia Recycling Association (VRA) is the only statewide, non-profit organization dedicated to expanding recycling in Virginia. The VRA is the Commonwealth's leading organization committed to the goal of promoting recycling as the fundamental part of conserving resources and reducing solid waste. Our membership is diverse – citizens, local government recycling coordinators, and business and industry professionals. We make possible the gathering and exchange of information, knowledge and ideas relating to recycling. Your report is most helpful in educating Virginia's elected officials about the many needs in this area.

The report's findings are detailed and will provoke much discussion regarding Virginia's waste reduction and recycling efforts. The study sites concerns and factors leading to the need for review and recommendations for long-term waste minimization goals and strategies. The VRA supports the report's recommendations, and offers the following specific comments:

Non-general fund sources. Several of the states surveyed by JLARC staff show their strong support for waste reduction and recycling by dedicating non-general funding sources for these programs. With additional resources, Virginia's Departments of Education (DOE), Environmental Quality (DEQ), and General Services (DGS) could develop more guidance and assistance to local government programs. At the State level, waste reduction activities are supported by only three full-time equivalents at DEQ and one unfunded position at DGS, as described in the JLARC report, and their time is largely occupied with tires, batteries, and the recycling rate reports. Additional resources would help create more effective programs. The 2009 General Assembly Session may wish to consider creating non-general fund sources and dedicating revenue generated from such sources to current and new waste reduction and recycling efforts. In a related matter, the VRA agrees with the finding of the JLARC report that the current Litter Prevention and Recycling Fund system in which the two activities compete against one another for funding is inherently flawed. They are both worthwhile and valuable efforts which involve unique activities working toward the goal of environmental quality. They need separate and adequate funding.

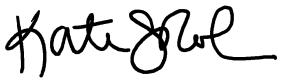
- *Adopt specific waste reduction goals*. Our neighboring states of North Carolina and West Virginia evaluate their solid waste streams and include goals for the reduction of municipal solid waste on a per capita basis. Solid waste reduction goals could include reduction at the source, and be determined by local government units that prepare plans and report to the State. Some states view waste reduction goals as more effective measurements than recycling rates for waste reduction.

- *Provide real assistance with market development*. The need to develop markets and businesses using recycled materials as "feed stock" has been recognized in Virginia since 1989. However, State assistance and resources have been very limited. The primary example is the complete absence of any resources for the Virginia Recycling Markets Development Council. As described in the JLARC report, North Carolina's Recycling Business Assistance Center (RBAC) and Pennsylvania's Recycling Markets Center (RMC) support and grow their states' recycling industries through financing, grants, loans, recycling tax credits, technical assistance and other financing resources and partnerships. For example: in May 2008, financial support furnished by the Pennsylvania Department of Environmental Protection's Recycling Markets Infrastructure Development Grant awarded $500,000 to LCL Industries, Inc., a new women-owned enterprise that will reuse more than 30,000 tons of recycled glass per year in Pennsylvania and create approximately 25 jobs.

- *Develop waste reduction activities and recycling programs in public schools*. Virginia's DOE should develop guidelines and promote waste reduction and recycling activities and programs in public schools pursuant to Code of Virginia §10.1-1425.9. DOE should consult and work with local government recycling coordinators and the VRA. In 2008, the VRA developed and conducted three School Recycling Workshops that were free of charge and open to anyone. The significant number of attendees, most of who do not work in the recycling industry, shows the widespread enthusiasm for recycling in our schools.

On behalf of the Virginia Recycling Association, we commend the General Assembly for charging JLARC to undertake this study. The VRA is ready to work with all interested parties to further explore and assist whatever options the General Assembly and the Governor believe appropriate in response to this report. Again, thank you for the opportunity to review and comment on the draft.

Sincerely,



Kate Sicola, President

cc: VRA Board of Directors

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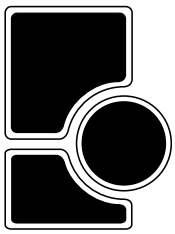

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