DEPARTMENT OF ECOLOGY
State of Washington

Solid Waste Management Cost Flows in Washington State

A Beyond Waste Project

Project Synopsis Report

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Solid Waste Management Cost Flows in Washington State

List of Figures and Tables

1 Introduction and Overview

As part of its 2004 Beyond Waste Plan for hazardous and solid waste management, the Department of Ecology outlined multiple recommendations to reduce waste generation, increase recycling, and reduce the use of toxic substances in Washington State. The Beyond Waste Plan recognized the importance of addressing funding needs as governments, businesses, and households in Washington State take steps to eliminate wastes and toxics. Because taxes and fees on solid and hazardous waste generation support many current waste management activities, reducing waste generation could decrease funding for the overall system that helps collect, transport, recycle, and dispose of waste. One recommendation (SW14) in the Beyond Waste Plan called for an evaluation of current financing for the solid waste system as the first step in a longer-term effort to examine future funding options and identify stable ways to fund solid waste management efforts, while reducing waste.

This current cost estimation project is the first step of that broader effort to help Ecology and the Washington State Solid Waste Advisory Committee (SWAC) evaluate solid waste funding and needs. The primary goal of this project is to provide a **comprehensive estimate of statewide costs of and revenues from solid waste management activities and services in Washington State**, including disposal, recycling, and other activities. A secondary goal is to identify gaps and limitations in existing information regarding revenues and expenditures. Such an effort should contribute to future assessment of the system's ability to support waste disposal, recycling, moderate-risk waste management, and other waste management activities, as Washington makes progress toward its Beyond Waste vision.

Beyond Waste Vision

We can transition to a society where waste is viewed as inefficient, and where most wastes and toxic substances have been eliminated. This will contribute to economic, social, and environmental vitality.

Prior to this project, no comprehensive quantification of solid waste revenues and expenditures had been conducted for Washington State. In 2003, the Solid Waste Policy Forum surveyed county solid waste managers, updating two previous surveys conducted in 1997 and 1999, but these prior studies did not include expenditures by state agencies, cities, or the private sector. The current project focused on documenting the major flows of dollars in a single calendar year – 2005 – while creating a methodology that can be updated in the future and revised to include additional information.

2 Key Findings

In 2005, governments, businesses, and residents in Washington State spent more than $1.8 billion on solid waste management, a figure that averages approximately $290 per capita in the state. This figure should be considered a conservative estimate, as data were not available to include for all waste streams or sectors of the economy.

Key findings regarding revenues and expenditures for 2005 include the following:

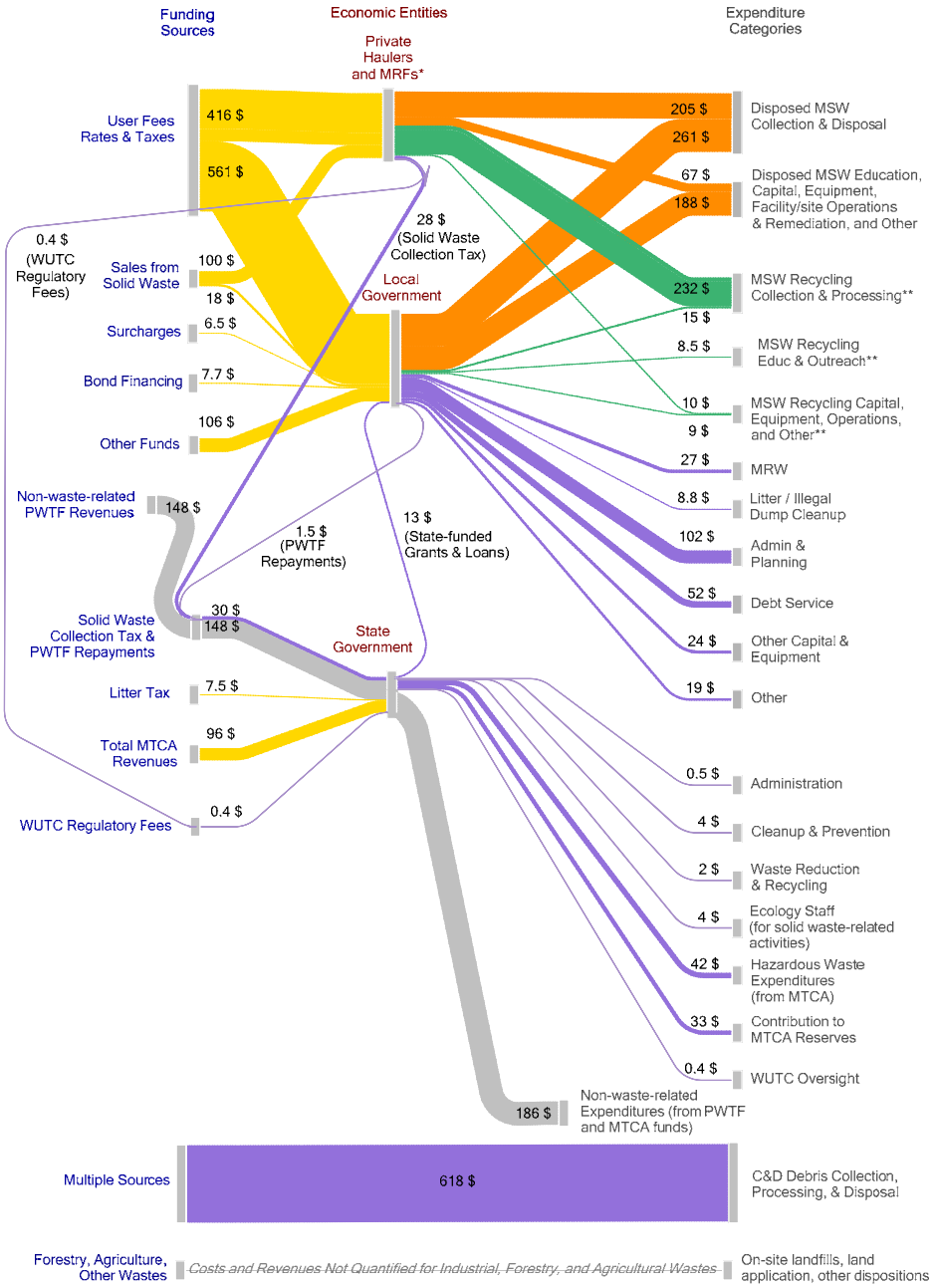
- **In 2005, Washington's governments, businesses, and residents together collected and spent more than an estimated $1.8 billion on activities related to solid waste management.** A majority of the solid waste system is funded through payments for service, and local governments collect most of their solid waste-related revenues via user fees, rates, and taxes.
- **Disposed municipal solid waste (MSW)**, the largest waste stream, accounted for nearly 40% of total expenditures.
- **Construction and demolition (C&D) debris** was estimated to represent about one-third of the total. This figure was modeled based on reported quantities collected and estimated costs-per-ton, as entities in this sector did not report revenue and expenditure data.
- **Recycling, composting, and waste reduction of MSW materials** are estimated to contribute 15% of the total. As with C&D debris, this figure was modeled based on reported quantities collected rather than from reported cost data.
- **Moderate risk waste (MRW)** activities accounted for local government spending of $27 million, about 2% of total solid waste expenditures, but this figure does not include expenditures by private-sector MRW collection companies or State government.

Figure 1 depicts the estimated monetary flows through Washington's solid waste system. In this Sankey diagram, lines are sized in proportion to the relative magnitude of the monetary flows. Tables 1 and 2 also present these monetary flows. Figures may not sum to subtotals and grand totals due to rounding.

Table 1 presents total estimated solid waste expenditures broken down by sector (in columns) and type of activity (in rows). It shows where money was spent directly on solid waste-related activities, excluding funds that were "passed through" from one entity to another (e.g., State grants to local governments), where possible.

Table 2 presents the total estimated revenues broken down by sector and funding source. It also includes funding passed through from State government to local governments.

Figure 1. Estimated Monetary Flows in Washington's Solid Waste System in 2005
(Figures in millions of dollars)



Dollar amounts are shown in millions. The labeled gray bars represent major entities or activities involved in Washington's solid waste system and the colored bands represent flows of money between these entities and activities. The width of each flow is proportional to the dollar amounts represented. More specifically, yellow flows depict revenues entering the system. Orange flows represent final expenditures on disposed MSW. Green flows represent final expenditures on MSW recycling, composting, and waste reduction. Violet flows represent final expenditures on other categories or pass-throughs (e.g., grants to local governments or solid waste collection taxes paid by haulers). "Recycling" includes composting and waste reduction.

* In this diagram, all commercial recycling (e.g., by businesses) is represented as passing through haulers or MRFs, thus no flow runs directly from "User Fees, Rates, & Taxes" to "MSW Recycling Collection and Processing." In addition, it was not possible to separate local government expenditures on disposed MSW that pass through haulers from direct expenditures on disposal. Consequently, local governments are depicted as responsible for a larger portion of disposed MSW expenditures that may be the case.
** Recycling in this report also refers to composting and waste reduction.

Table 1. Total Estimated Solid Waste Expenditures[1]

(Figures in millions of dollars)

Total Solid Waste Expenditures							
	Cities	**Counties**	**Health Jurisdictions**	**Private Sector**	**State Government**	**Miscellaneous Sources**	**Total**
Disposed MSW	**$252**	**$196**	**$1.3**	**$273**	**NA**	**NA**	**$722**
Collection, Transport, Processing, and Disposal	$160	$101	NA	$205	NA	NA	$467
Education & Outreach	see "other"	see "other"	see "other"	NA	NA	NA	$0
Capital Improvements	$36	$13	NA	NA	NA	NA	$49
Equipment (purchase/maintenance expenditures)	$5.6	$16	$0	NA	NA	NA	$22
Operation, Monitoring, & Maintenance of Active Landfills & Disposal Sites	$29	$23	$0.3	NA	NA	NA	$53
Monitoring & Maintenance of Closed Landfills & Disposal Sites	$2.4	$7.0	$0.1	NA	NA	NA	$10
Site Cleanup/Remediation of Closed Landfills & Disposal Sites	$10	$1.0	$0	NA	NA	NA	$11
Other	$9.1	$35	$0.9	$67	NA	NA	$112
MSW Recycling	**$18**	**$15**	**$0**	**$243**	**NA**	**NA**	**$275**
Collection and Transport Operations	$9.4	$5.9	$0	$232	NA	NA	$247
Education & Outreach	$1.7	$6.8	$0	NA	NA	NA	$8.5
Capital Improvements	$1.5	$0.8	$0	NA	NA	NA	$2.3
Equipment (purchase/maintenance expenditures)	$3.4	$0.1	$0	NA	NA	NA	$3.4
Operation & Maintenance of Recycling Facilities	$0.3	$1.4	$0	NA	NA	NA	$1.6
Other	$1.5	$0.1	$0	$10	NA	NA	$12
Total MRW	**$4.6**	**$21**	**$1.2**	**NA**	**NA**	**NA**	**$27**
Total Litter/ Illegal Dump Cleanup	**$4.8**	**$2.7**	**$1.3**	**NA**	**NA**	**NA**	**$8.8**
Total Capital & Equipment	**$14**	**$10**	**$0**	**NA**	**NA**	**NA**	**$24**
Total Admin, Enforcement, Planning, Other Activities	**$36**	**$63**	**$2.5**	**NA**	**NA**	**NA**	**$102**
Total Debt Service	**$15**	**$36**	**NA**	**NA**	**NA**	**NA**	**$52**
Total Other Expenditures	**$17**	**$1.7**	**$0.2**	**$0.6**	**$11**	**NA**	**$31**
C&D Debris	**NA**	**NA**	**NA**	**NA**	**NA**	**$618**	**$618**
Sub-total	**$363**	**$346**	**$6.5**	**$516**	**$11**	**$618**	
					GRAND TOTAL		**$1,860**

[1] Totals in tables and figures may not sum exactly due to rounding.

Table 2. Total Estimated Solid Waste Revenues[2]
(Figures in millions of dollars)

State Government Revenues			
Solid Waste Collection Tax	$28.2		
PWTF Repayments	$1.5		
Litter Tax	$7.5		
WUTC Regulatory Fees	$0.4		
Total	**$38**		
Funding Provided to Local Governments by State Government			
Coordinated Prevention Grants (Funded by MTCA)	$8.4		
Remedial Action Grants and Loans (Funded by MTCA)	$1.0		
Community Litter Cleanup Program (Funded by Waste Reduction, Recycling, and Litter Control Account)	$1.5		
Public Works Trust Fund Grants & Loans (Funded by PWAA)	$2.6		
Public Participation Grants (Funded by MTCA)	$0.2		
Total	**$14**		
Local Government Revenues			
Funding Source	**Cities**	**Counties**	**Health Jurisdictions**
User Fees, Rates, and Taxes	$279	$278	$4.3
Surcharges	$1.6	$4.9	$0
Bond Financing	$7.7	$0	NA
Sales from Solid Waste Operations	$2.6	$15	NA
Other Funds	$64	$42	$0.8
Total	**$354**	**$340**	**$5.1**
Private Revenues			
Household and Business Payments to Haulers for	$416		
Sales from Recycling Operations	$100		
Total	**$516**		
Unclassified Revenues			
Financing for C&D Debris Mgt.	**$618**		
	GRAND TOTAL		**$1,871**

[2] The grand total of revenues does not include funding provided to local governments by state government to avoid double-counting with State government revenues. This table does not include $96 million in revenues related to the Model Toxics Control Act (MTCA); the hazardous substance tax contributes the bulk of these revenues. A portion of these funds are intended for solid waste uses, but a "solid waste" share of the revenue stream could not be allocated.

3 Research Approach and Methodology

This project focused on gathering data on revenues and expenditures, or cost flows, from key economic actors for the major waste streams that have publicly available data. Economic actors from whom data were collected included:

- State government;
- Counties;
- Cities;
- Health jurisdictions; and
- WUTC-regulated certificated solid waste collection companies.

In addition, costs were estimated for non-regulated commercial recyclers and C&D debris handlers.

This cost estimation project included the following major waste streams:

- Disposed and recycled municipal solid waste (MSW);
- Moderate risk waste (MRW) handled by governments; and
- Construction and demolition (C&D) debris.

In light of data constraints, several potentially large waste streams were excluded from the cost estimation. Industrial waste, hazardous waste, nuclear waste, agricultural and silvicultural waste, petroleum contaminated soil, fly ash, biosolids and septage, and emissions and effluent were not included in this project.

Dollars can pass through several entities in the waste system; dollars first enter the system as revenues, pass from hand to hand, and eventually leave the system as final expenditures. For example, local governments received loans from the State government's Public Works Trust Fund, which collects revenues from the solid waste collection tax that waste collection companies pay. To make analysis of this complex system more manageable, this project focused on counting dollars when they first entered the system as revenues and when they exited as expenditures, rather than on "pass-throughs" that cycle through the waste system. Where possible, this estimation also attempted to track significant pass-throughs in order to reduce double-counting. The project was unable to quantify some pass-through funds, notably MSW expenditures that local governments pay to waste collection companies, except where local governments identified these cost flows in the data that they provided. A technical data memorandum provides more detail on the methodology of this cost estimation project.

3.1 Data Sources

State and Local Government Data Sources

State government cost flows were determined from information that the Department of Ecology provided revenues, authorizations, appropriations, and expenditures from Ecology and the Department of Revenue. Local government cost flows were estimated using surveys distributed to all of Washington's 39 counties, all 35 health jurisdictions, and a stratified sample consisting of 62 of the state's approximately 290 cities. From those contacted, 34 counties, 29 health jurisdictions, and 49 cities provided data for the cost estimation. Estimates for non-respondents were extrapolated from data received from respondents, weighted by population.

Private-Sector Disposed and Recycled MSW Data Sources

Private-sector cost flows were estimated from two sources. Revenues and expenditures for the more than 60 solid waste collection companies that are certificated by the Washington Utilities and Transportation Commission (WUTC) were obtained from annual reports filed with the WUTC. These cost flows include commercial and residential MSW collected for disposal as well as residential MSW collected for recycling and composting. Commercial recycling and composting activities are not reported to the WUTC.

Estimates of the total costs of commercial recycling activities were made by applying expected per-ton cost figures to statewide totals of commercial recycling tonnages by material that the Department of Ecology provided. Per-ton cost estimates were developed using both published sources and internal program estimates developed by the consultant. The estimate includes the cost to collect, process, and market standard recyclable materials collected from the commercial sector. Materials in the estimates included containers (glass, metal, and plastic), paper (including cardboard), textiles, white goods, food scraps, and yard waste. Materials that are hazardous, industrial in origin, or from construction and demolition activities were excluded from this estimate. A technical data memorandum provides additional details.

C&D Debris Data Sources

Construction and demolition debris (C&D) cost flows were estimated using a model that included reported tonnages, distances traveled, and average costs. The Department of Ecology provided statewide figures for C&D debris tonnages that were disposed and recycled in 2005. C&D debris quantities reported to the Department of Ecology included the following material categories: construction and demolition materials, inert waste, asbestos, wood waste, land-clearing debris, brick and masonry, ceramic materials, asphalt and concrete, and uncontaminated soils. Per-ton and per-mile costs were estimated based on published sources and analysis that the consultant conducted. Transport distance was estimated based on information that Ecology provided on tons of C&D debris generation by county and the individual facilities where the debris was disposed or recycled.

Waste Flows and Economic Actors Not Included

Due to data and resource constraints, not all waste flows or waste actors could be included in this estimation of solid waste cost flows. The project did not focus on the following waste streams: industrial solid waste; fly ash; agricultural waste; logging debris; biosolids or septage; petroleum contaminated soil (PCS); high-level hazardous waste; nuclear waste; emissions, including carbon; effluent; or other materials.

Data were not collected from Tribes, school districts, non-regulated waste service companies and commercial recyclers, or private waste disposal and recovery facilities. Private-sector data included in the cost flow estimates were gathered from WUTC annual reports as well as estimated using known material tonnages and cost-per-ton estimates.

Table 3. Summary of Revenue Sources Included in Data Collection Requests

Counties, Cities, and Health Jurisdiction Revenue Sources
User Fees, Rates, and Taxes:
Solid waste, composting, and recycling tip fees (or related payments)
Fees for planning, permits, advance disposal (ADF), and collection/disposal districts
Fees/revenues from cities
Taxes related to solid waste
Surcharges for Collection, Recycling, and Disposal
Grants, Loans, and Bond Financing:
Coordinated Prevention Grants (CPG)
Remedial Action Grants
Community Litter Cleanup Program (CLCP) grants
Public Works Trust Fund (PWTF) loans
Bond financing
Revenues from Sales (e.g., electricity, landfill gas, recyclable materials)
Other Sources of Funds:
Interest income
Enforcement infractions, fines, and penalties
Reserves/fund balance and general funds
Grants, loans, and bond financing
State Revenue Sources
Litter tax
MTCA tax on hazardous substances
Solid waste collection tax
WUTC regulatory fees
Fines, penalties, and infractions
Other revenues
Hauler Revenue Sources
Revenues collected by certificated solid waste collection companies

Table 4. Summary of Expenditure Types Included in Data Collection Requests

Counties, Cities, Health Jurisdiction Expenditures
Municipal Solid Waste Disposal, Recycling, Composting, Waste Reduction, and MRW:
Collection, transfer station, and transportation operations
Education and outreach
Capital improvements
Equipment (purchase and maintenance expenditures)
Operations, monitoring and maintenance of active landfills, recycling facilities, MRW facilities, and other disposal sites
Monitoring, maintenance, and remediation for closed landfills and other disposal sites
Disposal or recycling of MRW
Litter/illegal dump cleanup
Administration, enforcement, planning, grants, and other activities
Debt service for active and closed facilities
Other expenditures, not specified elsewhere (waste- and non-waste-related)
State Expenditures
Coordinated Prevention Grants (CPG)
Community Litter Cleanup Program (CLCP) grants
Remedial Action Grants
Public Participation Grants (PPG)
Ecology staff (for solid waste-related activities)
Hauler Expenditures
Expenditures by certificated solid waste collection companies

3.2 Data Management and Analytical Tools

This project included development of a web-based data management tool to help collect, organize, and analyze cost flow data with a user-friendly interface. Multiple users can upload, view, modify, or query data. An Access database stores and maintains the data collected. The project also developed an accompanying spreadsheet model, known as the analytical tool, which uses information from the data management tool to estimate funding sources and expenditures for solid waste management activities in Washington. The analytical tool and database queries report estimates for the statewide system as a whole as well as for various actors within the solid waste system.

3.3 Data Strengths and Limitations

This project focused on cost flows associated with the major public and private entities and solid waste streams with publicly available data, so several entities and wastes were necessarily excluded. The data that were collected were typically quite thorough. State government revenues and expenditures were derived from actual receipts, appropriations, and program spending. Local governments provided a strong overall survey response. Certificated solid waste collection companies are required to report certain data to WUTC in their annual hauler reports, which the project reviewed. For C&D debris and commercial recycling, cost flows were calculated based on known quantities and estimated unit costs. To the extent feasible, double-counting was avoided by excluding grants, loans, contracts, and other "pass-throughs" from the final total (and tracking them at the point of actual expenditure on waste-related activities), though not all double-counting could be removed, particularly between local governments and other entities.

On balance, we expect that these figures provide a reasonable, if conservative, estimate of solid waste costs and funding sources. Some areas for potential improvement include the monetary flows for C&D debris and commercial recycling, which were derived using models based on estimated costs and prices for transportation, disposal, processing, and material sales. Local government data are incomplete because not all entities were surveyed (a stratified sample consisting of 62 of Washington's approximately 290 cities was asked to provide data for the project), and not all surveyed entities responded. In some cases, those that did respond provided less detail than requested. In particular, expenditures reported by small, western Washington cities are significantly lower than those reported by small, eastern Washington cities, which raises the possibility that the sample, though random, may not best represent that particular stratum.

Local governments reported spending more than certificated solid waste collection companies on collection and disposal. Some of these expenditures were likely made to private-sector waste collection companies that undertake the actual disposal; however, given the survey data, it is not possible to quantify the size of this pass-through of funds.

3.4 Summary of Key Assumptions

Due to data constraints, this cost estimation effort involved several assumptions that may influence the breakdowns of expenditure and revenue categories and the total dollar amounts for the waste system as a whole. Key assumptions that may affect the State and local government estimates include:

- It was not possible to separate local government expenditures on disposed MSW that pass through haulers from direct expenditures on disposal. Consequently, local governments are depicted as being responsible for a larger portion of disposed MSW expenditures than may be the case.
- Local government entities that did not submit data were assumed to have similar revenues and expenditures on a per-capita basis to the average cost figures of reporting entities. Cities were stratified into five groupings by size and location (in eastern or western Washington), while counties and health jurisdictions were each considered as a group.
- Assumptions were made regarding the portion of expenditures from the Model Toxics Control Act (MTCA) accounts that was considered solid waste-related, as precise budget tracking by category was not available. In 2005, MTCA-related revenues totaled $96 million, and about $15 million was estimated as expenditures for solid waste-related uses.

Key assumptions that may affect the revenues and expenditures for disposed municipal solid waste, MSW recycling, and C&D debris include:

- Non-regulated revenues (e.g., revenues from city contracts) of certificated solid waste collection companies, as reported to WUTC, were not included in effort to avoid double-counting. These amounts are assumed to be reflected in the city data and extrapolated results. If these non-regulated revenues are not in fact included in the monetary figures, total expenditures would be underestimated. Class A and B haulers reported collecting revenues of $430 million from non-regulated waste activities in 2005; Class C haulers were not required to report their non-regulated revenues, but their waste activities represent only a small fraction of total hauler revenues and are not expected to change the totals significantly.[3]

[3] According to WAC 480-70-041, Class A and B haulers are traditional solid waste collection companies with an annual gross operating revenue from regulated, intrastate operations (in Washington) of more than $5 million (Class A) or less than $5 million (Class B). Class C haulers are solid waste collection companies that do not provide traditional residential or commercial solid waste operations. Class C haulers include specialized carriers generally hauling specific waste products for specific customers or providing only on-call or non-scheduled service. Class C haulers submit a different, less detailed annual report form than do Class A and B haulers.

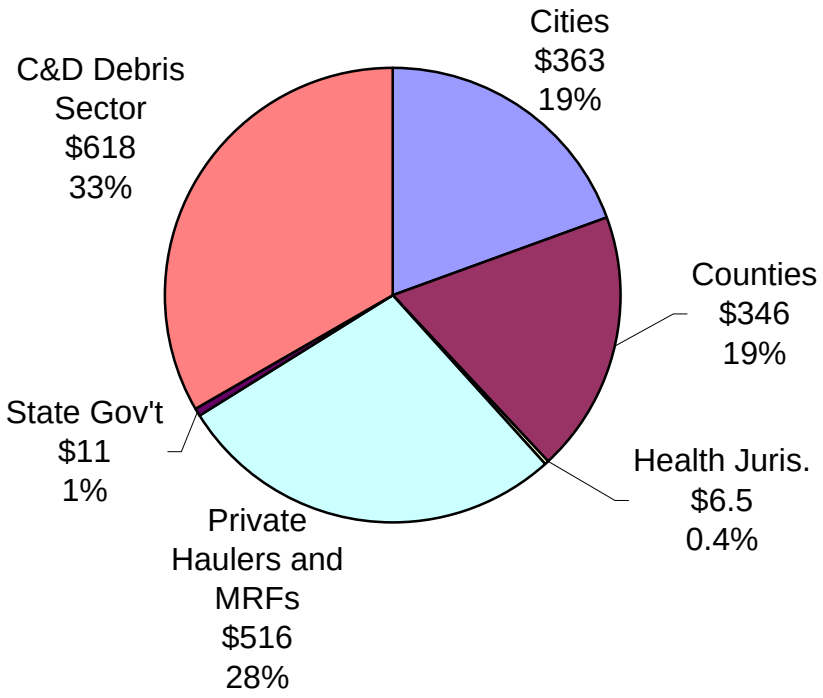
- Estimates for commercial recycling were based on assumptions regarding the revenues per ton, by material, that commercial recycling companies obtained in fees and material sales. Similarly, assumptions were made regarding the expenditures per ton to collect and process recyclable materials from businesses and institutions. Commercial recycling cost figures for Washington are not reported publicly, and collecting data from private commercial recycling companies or their customers was beyond the scope of this project.
- Estimates for C&D debris were based on assumptions regarding the costs per ton and per mile to transport and dispose or recycle C&D debris. Assumptions were also made regarding the average distance that C&D debris is transported. C&D debris collection, disposal, and recycling companies do not publicly report their cost figures for Washington, and collecting data directly from these companies was beyond the scope of this project.

Assumptions regarding moderate risk waste (MRW) are covered in the MRW section, as the dollar flows related to covered wastes are not expected to be large enough to have a sizeable effect on the overall cost estimates. A technical data memorandum discusses assumptions and methodologies in more detail.

4 Overall Solid Waste Expenditures

In 2005, Washington spent over $1.8 billion on solid waste, or approximately $290 per capita. Cities and counties each contributed about 20% of total expenditures, while the private sector accounted for nearly 30%.[4] Approximately one-third of the total was spent on C&D debris. This project did not allocate C&D debris cost flows by sector, though the majority is expected to be in the private sector.

Figure 2. Total Estimated Expenditures by Sector[5]
Total = $1.8 billion (figures in millions of dollars)

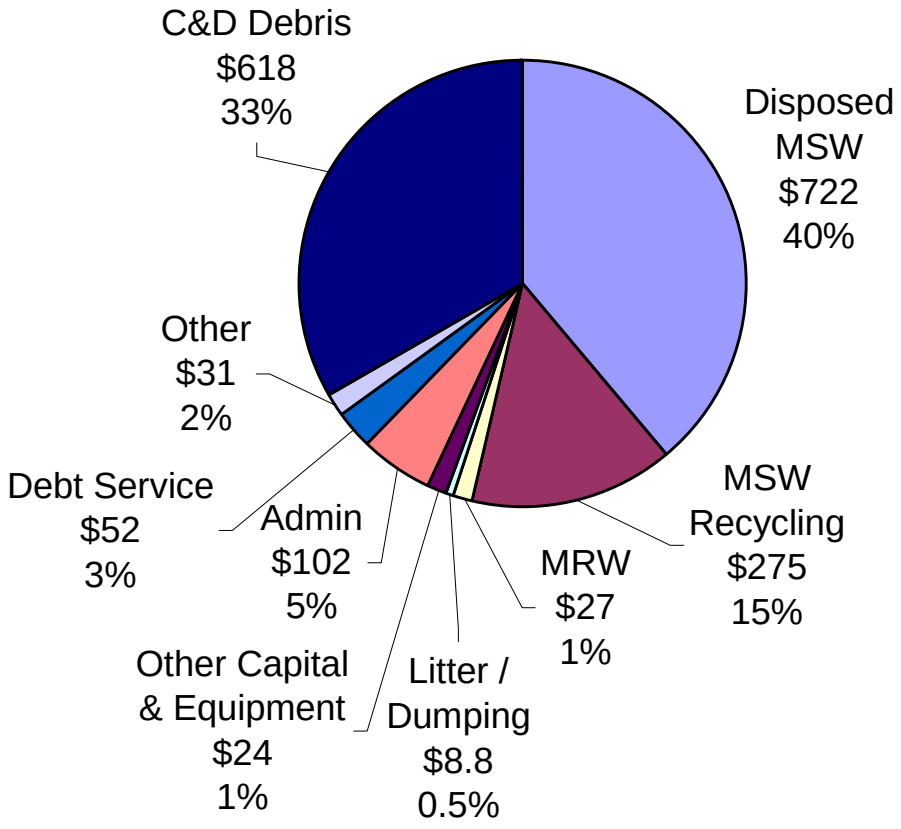


[4] Because this study did not quantify the amount of spending by local governments on disposed MSW that passes through solid waste collection companies on the way to final disposal, haulers may actually represent a larger share of final expenditures and local governments a smaller share. Final expenditures are defined as the last expenditure on solid waste before the money leaves the waste system.

[5] State government expenditures do not include funding provided to local governments by State government to avoid double-counting.

Disposed MSW and C&D debris were the largest two waste streams, accounting for 40% and 33% of all solid waste dollars spend in Washington State, respectively. MSW recycling, composting, and waste reduction were estimated to account for a smaller proportion of total expenditures, about 15%.

Figure 3. Total Estimated Expenditures by Category
Total = $1.8 billion (figures in millions of dollars)



5 Solid Waste Cost Flows by Sector

This section summarizes cost flows by sector, including State government, local government, and the private sector. Cost flows related to counties, cities, and health jurisdictions are combined into a single "local government" category, as responsibility for solid waste functions varies from jurisdiction to jurisdiction.

5.1 State Agencies

Washington's State-level government is estimated to have collected about $38 million in solid waste-related revenues in 2005, primarily from its solid waste collection tax and litter tax. Additionally, some of the revenues that the hazardous substance tax and other sources contribute to the Model Toxics Control Act (MTCA) accounts are intended for solid waste uses; those revenues totaled $96 million in 2005. As with other State revenue sources, MTCA expenditures are authorized by the State Legislature through budget appropriations. The MTCA hazardous substance tax is a volatile source of revenue because it is linked to the price of oil, and revenues vary significantly from year to year. The State Legislature generally approves appropriations drawing from the MTCA accounts before actual revenues are known. In calendar year 2005, the MTCA fund balances were higher than anticipated, and the authorized expenditures left more than $30 million of that year's receipts in the accounts as fund balance for future spending. When revenues are significantly higher than anticipated, the Governor, the Legislature, and stakeholders engage in thoughtful deliberations to determine the highest priorities for the extra funds. These processes take time, causing delays in spending and resulting in high fund balances at times.

Table 5. Estimated State Government Revenues
(Figures in millions of dollars)

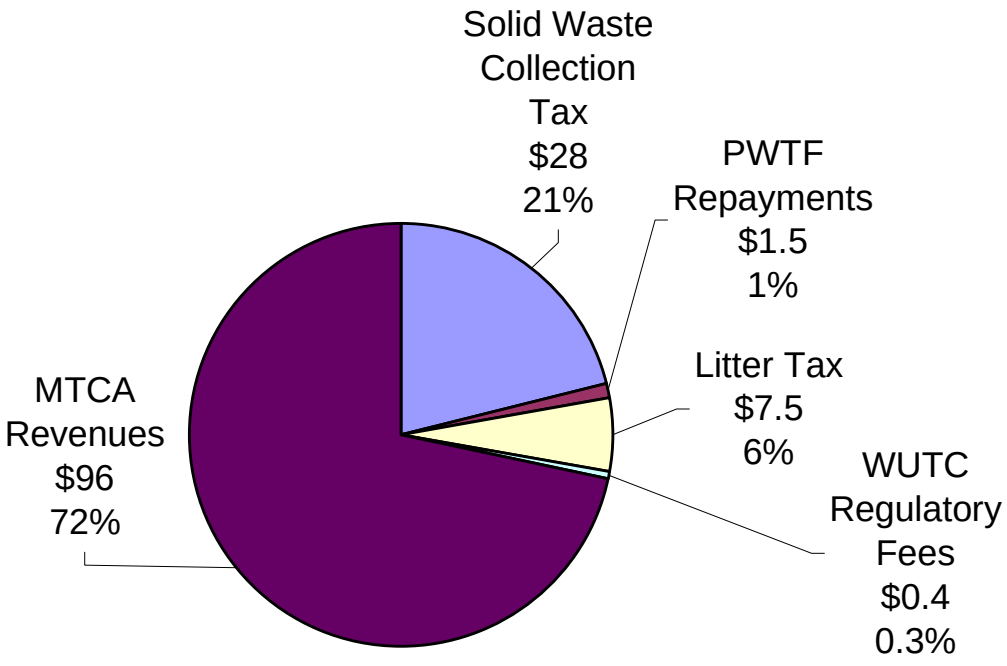
State Government Revenues	
Solid Waste Collection Tax	$28.2
Public Works Trust Fund (PWTF) Repayments	$1.5
Litter Tax	$7.5
WUTC Regulatory Fees	$0.4
Solid Waste Revenues Subtotal	***$38***
Model Toxics Control Act (MTCA) Revenues	$95.8
Total	**$134**

Table 6 presents estimated State government expenditures. The State government spent approximately $25 million on solid waste-related expenditures. A significant portion of solid waste revenues ($14 million) was used for grants and loans to local governments, and additional funds were used for Ecology staff, direct expenditures by Ecology on solid waste programs, and program administration. The solid waste collection tax is one source of revenue for the Public Works Trust Fund (PWTF), which provides low-interest loans for a variety of public works projects in local communities. Of the nearly $30 million that solid waste-related efforts contributed to the Public Works Trust Fund via the solid waste collection tax and PWTF loan repayments, less than 10%, or about $2.6 million, was expended on solid waste projects in 2005. The State government also spent $42 million on hazardous waste-related expenditures, and approximately $33 million in the MTCA accounts was carried over for future use; however, these figures are not included in the estimate for total expenditures on solid waste management in Washington.

Table 6. Estimated State Government Expenditures Related to Solid Waste
(Figures in millions of dollars)

State Government Solid Waste Expenditures	
Coordinated Prevention Grants (CPG)	$8.4
Remedial Action Grants	$1.0
Community Litter Cleanup Program (CLCP)	$1.5
Public Works Trust Fund (PWTF)	$2.6
Public Participation Grants	$0.2
Administration	$0.5
Cleanup and Prevention (from MTCA and Litter tax revenues)	$4.0
Waste Reduction and Recycling (from Litter tax revenues)	$2.0
Ecology Staff (for solid waste-related activities, from MTCA revenues)	$4.0
WUTC Regulatory Oversight	$0.4
Solid Waste Subtotal	***$25***
State hazardous waste-related expenditures	$42
Estimated MTCA fund balance (unappropriated in 2005)	$33
State non-waste-related expenditures	$7
Total	**$106**

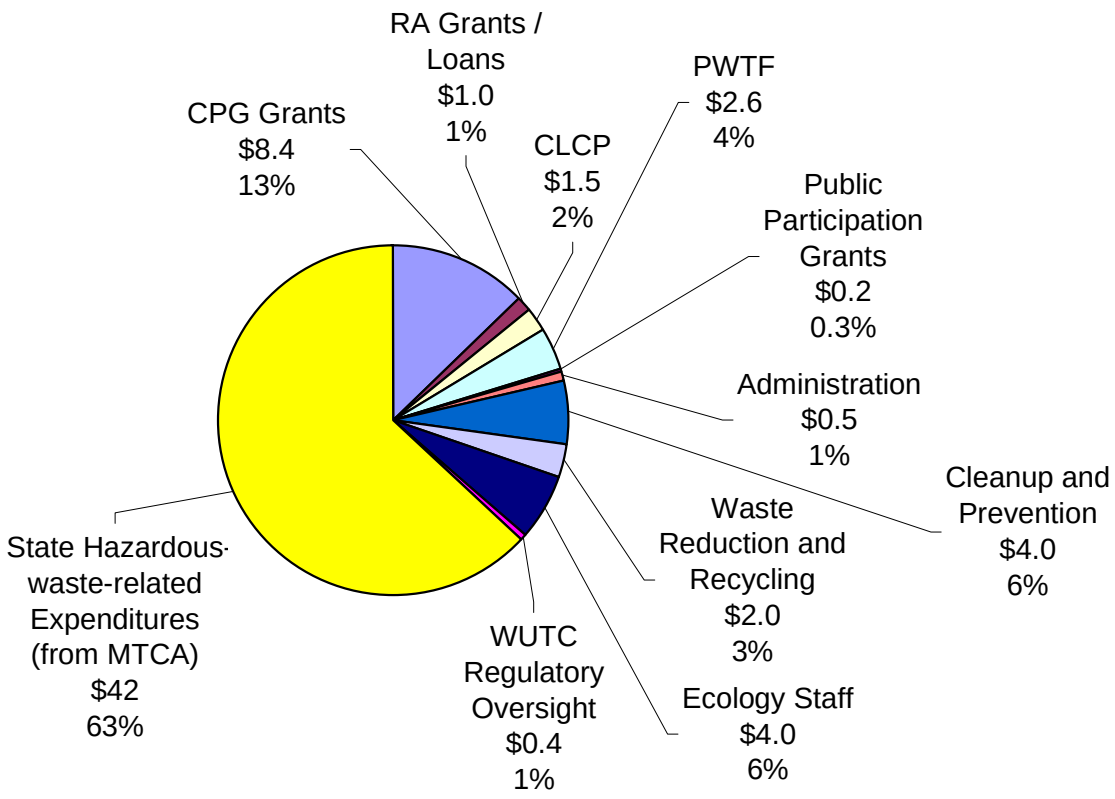
Figure 4. Estimated State Government Waste-related Revenues[6]
Total = $134 million (figures in millions of dollars)



[6] These figures include solid waste-related revenues, as well as revenues related to the Model Toxics Control Act (MTCA). MTCA revenues are derived primarily from the hazardous substance tax. A portion of these funds are intended for solid waste uses, though a "solid waste" share of the revenues could not be allocated.

Figure 5. Estimated State Government Waste-related Expenditures[7]

Total = $66 million (figures in millions of dollars)

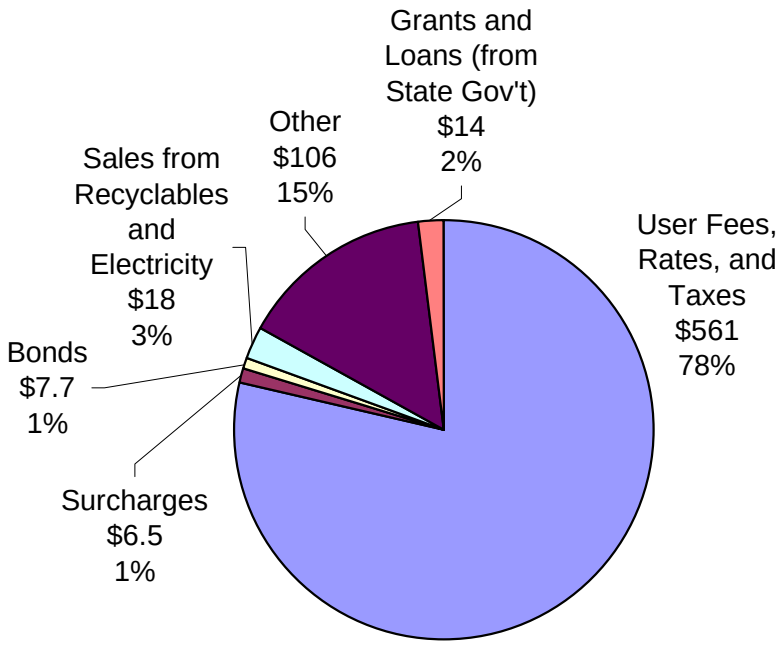


[7] These figures include solid waste-related expenditures, as well as expenditures from the Model Toxics Control Act (MTCA) accounts. MTCA revenues are derived primarily from the hazardous substance tax, and a portion of these funds are intended for solid waste uses. A "solid waste" share of the MTCA revenues could not be allocated, though the expenditures were apportioned between solid waste and hazardous waste efforts. An estimated $33 million in MTCA fund balance that was not appropriated in 2005 is not shown in this chart.

5.2 Local Governments (Counties, Cities, and Health Jurisdictions)

Local governments in Washington are estimated to have collected nearly $700 million in solid waste-related revenues in 2005. Counties collected an estimated $340 million; cities collected $355 million; and health jurisdictions collected $5.1 million. In addition, local governments received approximately $14 million from the State government in grants and loans, for total local government revenues of approximately $713 million. The primary sources of revenue for local governments were user fees, rates, and related taxes, accounting for nearly 80% of revenues. However, it is important to note that local government revenues and expenditures varied widely across jurisdictions because counties, cities, and health jurisdictions differ in geography, size and density of population served, solid waste functions performed, and many other factors. For example, some cities provide their own solid waste collection services or contract directly for such services, while in other areas certificated haulers collect waste pursuant to agreements with WUTC.

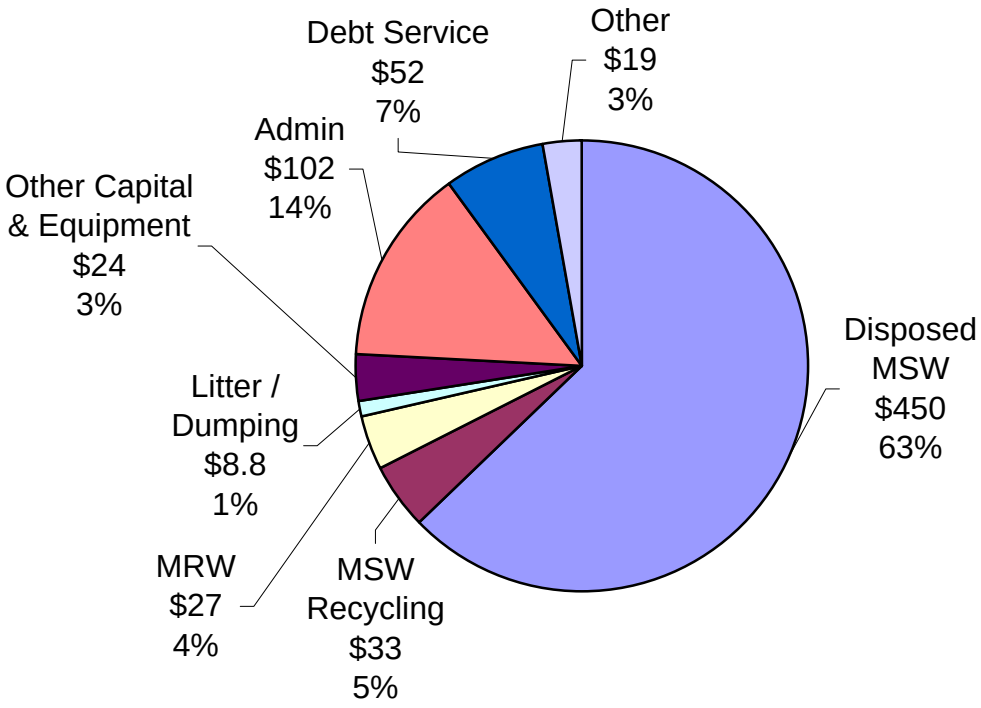
Figure 6. Estimated Local Government Revenues[8]
Total = $713 million (figures in millions of dollars)



[8] "Other" includes interest income; enforcement infractions, fines, and penalties; subsidies; reserves/fund balance; general funds; and other funding sources.

Local governments are estimated to have spent approximately $715 million on solid waste management, primarily on disposed MSW (63%).[9] Counties spent an estimated $346 million; cities spent $363 million, and health jurisdictions spent $6.5 million.[10]

Figure 7. Estimated Local Government Expenditures
Total = $715 million (figures in millions of dollars)



Cities: Variations across Size and Location

To improve accuracy of the statewide estimate of total revenues and expenditures for Washington cities, this project used a stratified, random sampling design. With this method, 62 of Washington's approximately 290 cities and towns were included in the sample, stratified according to their size and location within the state. This sampling method divided all Washington cities into five strata: one stratum for large cities (population over 40,000), two strata for medium-sized cities (population between 5,000 and 40,000) in eastern or western Washington, and two strata for small cities (population less than 5,000) in eastern or western Washington.

This stratified sampling method offers several benefits. First, it protects against the possibility of an unusual sample that does not include adequate representation from one or more types of cities (e.g., a sample that has no cities from Eastern Washington). Second, stratified random sampling incorporates

[9] The difference between local government revenues and expenditures may be due to revenues drawn from non-solid-waste sources (such as a general fund) or from accumulated accounting or reporting differences in the local government surveys.

[10] As discussed above, a significant portion of local government expenditures on MSW likely consists of pass-through payments to private-sector waste collection companies, rather than final expenditures. Data gathered in this project did not provide sufficient information to quantify this amount.

additional characteristics (such as size and location) about the target population of cities that may influence the variables of interest, and thus it allows more accurate estimation of those figures. Accordingly, this sampling approach is designed to produce a more reliable estimate of the data of interest than would a simple random sample. The sample size and structure used in this project were not intended to support statistically significant comparisons among subgroups. Rather, a sufficient number of responses were received to estimate cost flows for the state as a whole but not for individual strata. Among large cities, 80% (18 cities) of these cities provided data, and 6 to 8 responses were obtained for each of the other strata, accounting for less than 15% of all western cities and small eastern cities and about 40% of medium-sized eastern cities in Washington.

Anecdotal comparisons of actual reported data suggest that per-capita spending generally increases with city size, with the largest cities spending about $120 per person and medium-sized cities spending slightly less than $80 per person. Medium-sized cities in both eastern and western Washington reported spending approximately the same amount per person, while small cities and towns in western Washington reported spending significantly less than small cities and towns in eastern Washington, although the random sample may not accurately reflect overall conditions in the state's smallest towns. Alternately, the sample may accurately reflect spending by small cities in western Washington, which may defer more solid waste functions to counties and private-sector waste collection companies than do small cities in eastern Washington. Because towns with fewer than 5,000 people represent only a small share of the state's total population, however, increasing their average per-person costs would not have a significant effect on the total statewide cost figures. For example, if small western cities were assumed to spend the same amount per person that small eastern cities reported on the survey, their combined expenditures would add approximately $7 million to the total statewide expenditures.

Counties: Variations by Location

County revenues and expenditures can be divided between eastern and western counties. Although counties in western Washington collected and spent more in total, counties in eastern Washington collected and spent more per capita. Overall expenditures for eastern Washington counties were approximately $82 per capita, while costs for western Washington counties were approximately $46 per person in 2005. One possible explanation is that higher populations and population densities in western Washington may make their solid waste programs, particularly collection, less costly on a per-capita basis. Cities may also cover more of these waste costs within western Washington counties than in eastern Washington counties, which have fewer and smaller cities on average. Western counties were estimated to spend a higher percentage of their total expenditures on MSW disposal than other waste-related activities than their eastern Washington counterparts (61% versus 48%). Note that the revenues discussed in this section include only those amounts that the counties collected directly; they do not include grants and loans from the State government.

5.3 Private Sector

WUTC-regulated certificated solid waste collection companies provide collection and disposal services for municipal solid waste; recycling and composting; moderate risk waste; and other waste. Certificated haulers are estimated to have collected and spent approximately $316 million in 2005 on regulated waste activities. Almost all of their revenues came from payments for service. Many WUTC-regulated haulers also collected garbage under contract with local governments, but these costs were not included in the estimates to avoid double-counting with data that local governments reported. Consequently, we expect that the overall estimate is conservative, and the actual total may be higher.

Certificated haulers primarily provide residential waste and recycling collection and business waste collection services. WUTC does not regulate commercial recycling services, though some otherwise-regulated waste collection companies are among the firms that collect commercial recyclables. Costs for private, commercial recycling (as opposed to residential recycling) were estimated using tons of recyclables (by material) reported to Ecology and per-ton estimates of processing costs and material sales prices. The total estimated cost of commercial recycling in Washington is $200 million. About half of this cost is paid directly by the businesses served (through recycling fees), while the other half is paid via sale of recyclable commodities.

Overall, the model estimates that private haulers and material recovery facilities (MRFs) spent approximately $516 million in 2005, of which just over half went to disposed MSW and slightly less than half of expenditures went to recycling.

Figure 8. Estimated Private Sector Revenues
Total = $516 million (figures in millions of dollars)

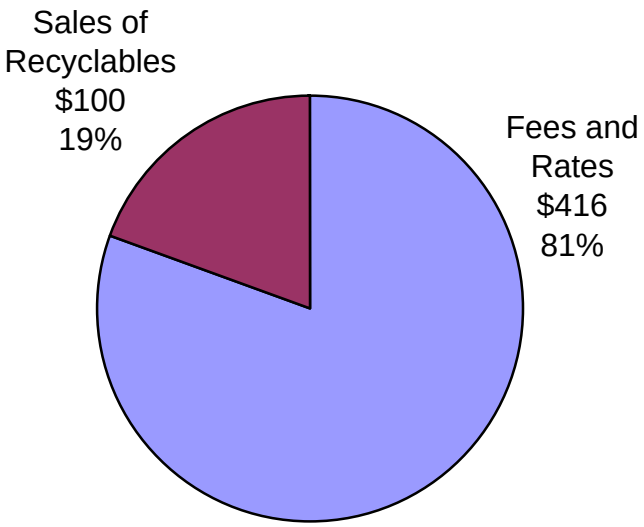
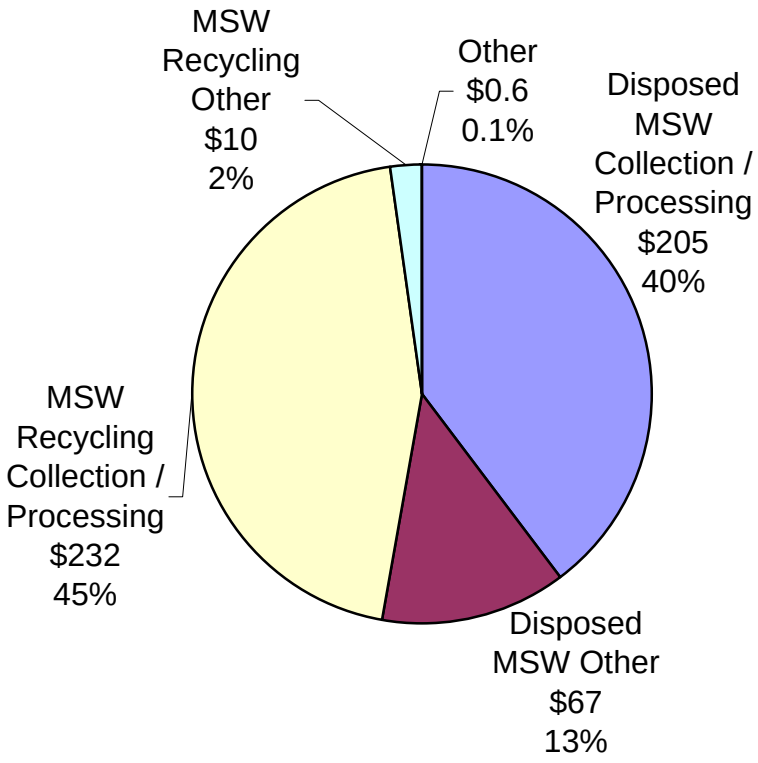


Figure 9. Estimated Private Sector Expenditures[11]
Total = $516 million (figures in millions of dollars)



5.4 Cost Flows Not Allocated by Sector

Construction and demolition (C&D) debris costs were not be broken down by sector and are discussed in Section 6.4.

[11] Disposed MSW Other and MSW Recycling Other expenditures include depreciation, management fees, selling and advertising, office and administration, taxes and licenses, rents, and other unallocated expenses. Other expenditures represent expenditures on medical waste.

6 Solid Waste Cost Flows by Waste Stream

This section summarizes cost flows for the three largest waste streams, which account for 87% of total expenditures. Slightly more than one-tenth of total costs, including administration and debt service, could not be assigned to individual waste streams, though they contribute to the cost of the solid waste system as a whole.

6.1 Disposed Municipal Solid Waste

In 2005, Washington spent about $722 million on collection, handling, and management of disposed municipal solid waste, over 60% by local governments and the remainder by the private sector. Nearly two-thirds of disposed MSW expenditures went to collection, transfer, transport, and disposal. Reportedly, about 7% each was spent on capital improvements to the system and on the operations, monitoring, and maintenance of active landfills and disposal sites.

Figure 10. Estimated Expenditures on MSW Disposal by Sector
Total = $722 million (figures in millions of dollars)

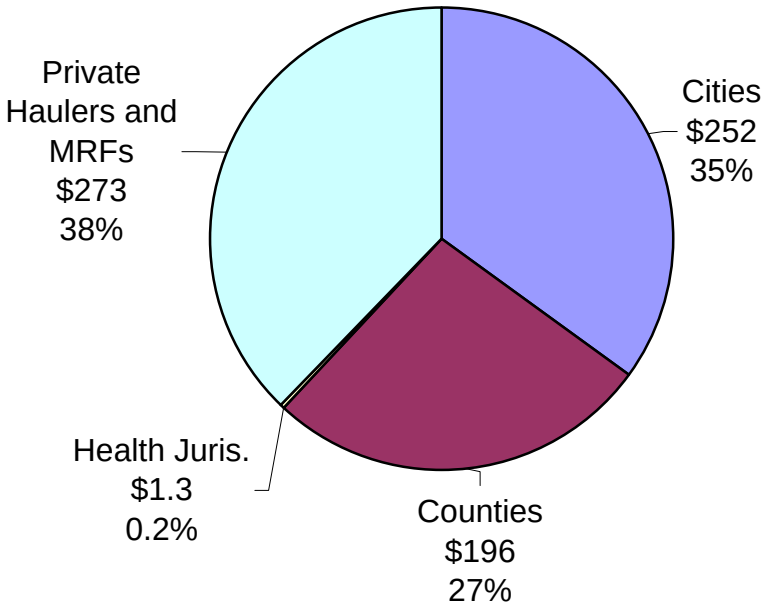
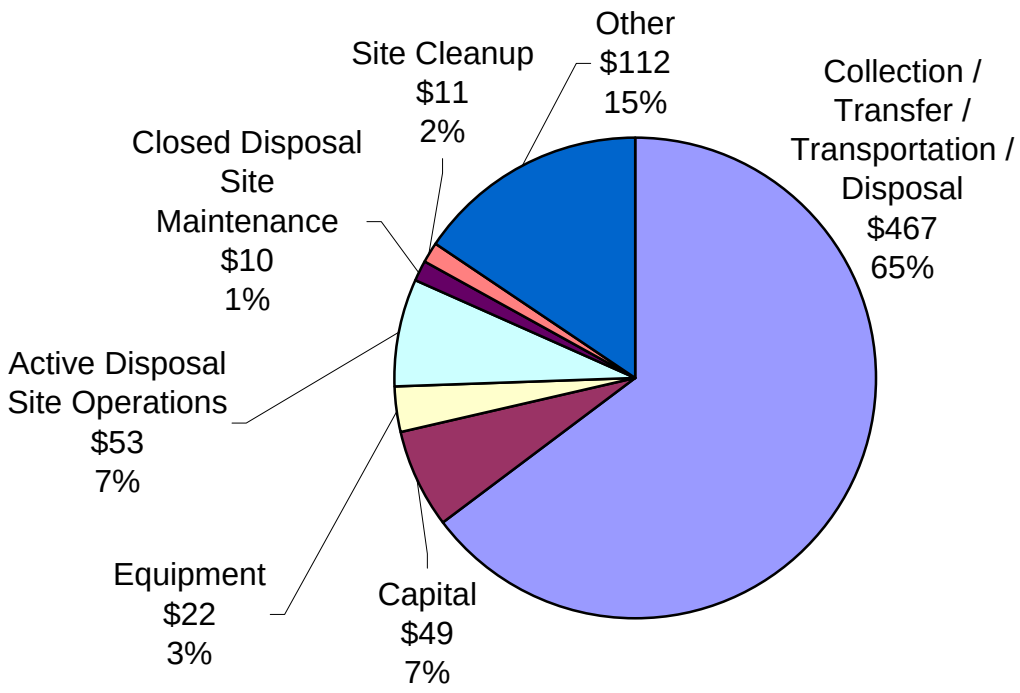


Figure 11. Estimated Expenditures on MSW Disposal by Activity[12]
Total = $722 million (figures in millions of dollars)



[12] Local governments reported expenditures on collection, transfer stations, and transportation. Certificated solid waste collection companies reported expenditures to the WUTC on collection, transportation, transfer, and disposal. MSW collection operations include transporting garbage from customers to transfer stations. It does not include collection of recycling or compostable materials. MSW transfer station operations include the operations and maintenance of transfer stations for municipal solid waste. MSW transportation operations include transporting garbage to landfills or other disposal sites, including hauling leachate and maintenance materials. It does not include equipment replacement transfer. "Other" expenditures include $67 million in depreciation, management fees, selling and advertising, office and administration, taxes and licenses, rents, and other unallocated expenses estimated for the private sector. It also includes $45 million in other expenditures by local governments that were not allocated to an expenditure category.

6.2 MSW Recycling, Composting, and Waste Reduction

Washington is estimated to have spent $275 million on recycling, composting, and waste reduction in 2005. Private-sector recycling companies were estimated to account for about $243 million, or 89%, of the $275 million total. Local governments paid the remaining 11% of costs.

The cost of recycling for commercial (as opposed to residential) customers in Washington is estimated at $200 million. About half of this cost is paid directly by the businesses served through recycling fees, while the other half is paid via sale of recyclable commodities. Because private commercial recycling costs were modeled using per-ton estimates, this project cannot break commercial recycling and related costs down by activity category, and it assumes that all expenditures on recycling for commercial customers went to collection and processing. Survey responses from local governments and annual reports from certificated haulers provided some additional information on this topic. Using these assumptions, an estimated 90% of MSW recycling expenditures went to collection and processing.

Figure 12. Estimated Expenditures on MSW Recycling by Sector
Total = $275 million (figures in millions of dollars)

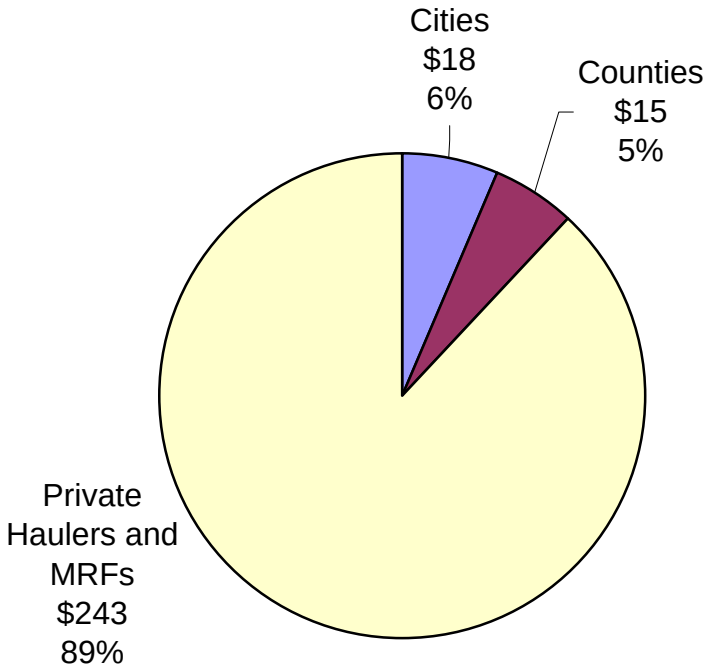
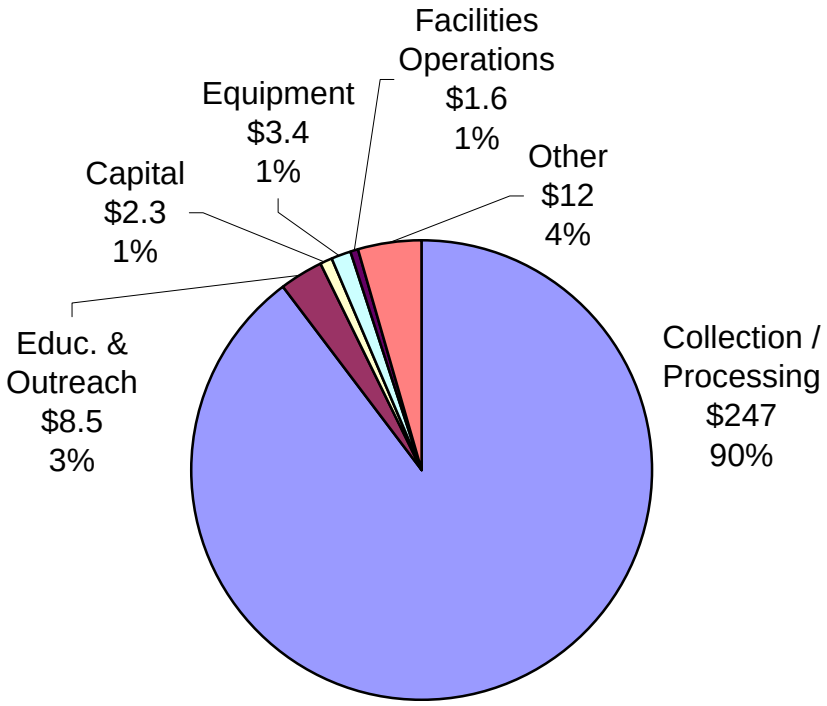


Figure 13. Estimated Expenditures on MSW Recycling by Activity
Total = $275 million (figures in millions of dollars)

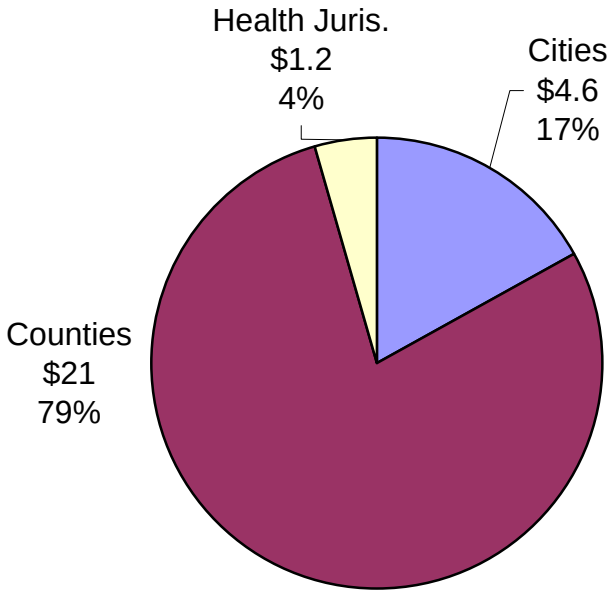


6.3 Moderate Risk Waste

Moderate risk waste includes household hazardous waste and hazardous waste from conditionally exempt small-quantity generators (CESQGs). In 2005, local governments in Washington are estimated to have spent approximately $27 million on managing moderate risk waste. This figure underestimates the total cost of managing MRW for two main reasons. First, only a portion of MRW from CESQGs is managed through local governments. The remainder of MRW may be handled by private-sector hazardous waste management companies, which were not surveyed. Second, the State government also has MRW functions, which were not tracked and reported separately from the State's other solid and hazardous waste expenditures.

It is important to remember also that hazardous waste generated by medium- and large-quantity generators, as well as regulated small-quantity generators, was outside the scope of this project. Hazardous waste management companies, which were not surveyed, typically handle these materials. Including the cost of hazardous waste management would significantly increase the total cost of Washington's waste system.

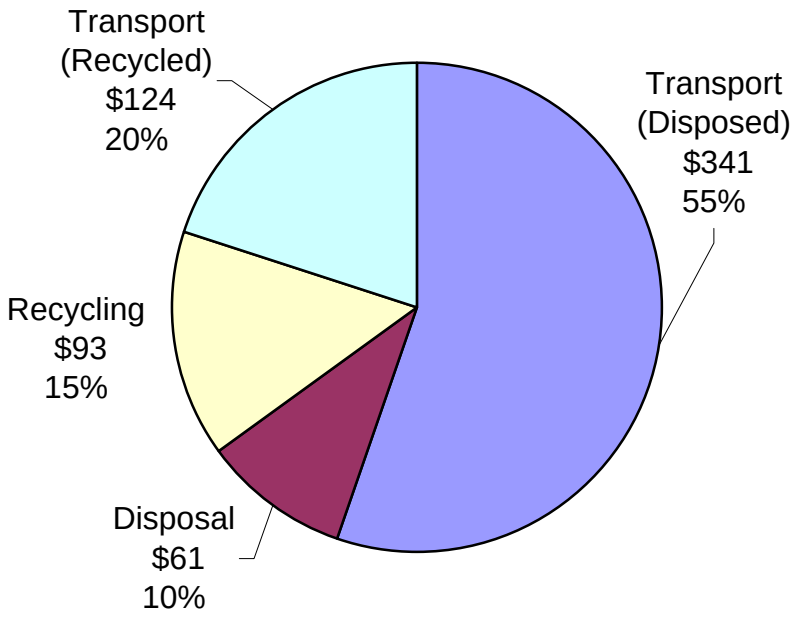
Figure 14. Estimated Expenditures on Moderate Risk Waste by Sector
Total = $27 million (figures in millions of dollars)



6.4 Construction and Demolition Debris

In 2005, Washington is estimated to have spent approximately $618 million on collecting, disposing, and recycling C&D debris. This figure was calculated using the tons of C&D debris generated in Washington, the estimated distance to final disposal and recycling sites, and cost functions and assumptions for transportation, disposal, and recycling. Most of the expenditures (75%) are estimated to go to transporting C&D debris.

Figure 15. Estimated Expenditures on C&D Debris by Activity
Total = $618 million (figures in millions of dollars)



6.5 Cost Flows Not Allocated by Waste Stream

About $217 million in expenditures could not be assigned to individual waste streams using the survey responses provided. Some expenditures, such as administration, were used for multiple waste streams while others could potentially be attributed to a waste stream, given more resources for reviewing and following up on local government data. These unassigned expenditures funded the following efforts:

- Litter and illegal dumping programs ($8.8 million);
- Other capital and equipment expenditures ($24 million);
- Administration, planning, and enforcement ($102 million);
- Debt service for active and closed waste facilities ($52 million); and
- Other uncategorized expenditures ($31 million).

Because these expenditures compose 12% of the total, they could significantly change the total estimated cost of managing individual waste streams and should be kept in mind as a potential source of variance when comparing waste stream costs.

7 Next Steps and Future Updates

The cost estimates developed in this project can help Ecology and the SWAC continue their evaluation of future funding needs and sources. This final section briefly discusses options for future updates and refinements as well as issues for Ecology and the SWAC to consider regarding future policy decisions. This project provided not only an estimate for solid waste system costs in 2005, but also an updatable database and a platform for continued future development and analysis. The database in its current form can be updated with data from future years for comparison over time. In addition, the database can be used as a basis for further refinement and expansion of the covered waste streams, revenues, and costs.

The project currently offers a conservative estimate of revenues and costs associated with key portions of the solid waste system in Washington State. Where data allow, it disaggregates these costs according to sector (e.g., local government) and waste stream (e.g., disposed MSW). The project was not intended to provide an estimate of future system costs, compare the costs of recycling versus disposal, or estimate waste system costs if the Beyond Waste Plan had not been adopted, though Ecology and the SWAC may wish to consider such topics in the future. With more data, such an analysis could provide a more comprehensive and detailed accounting of the waste system, including more detailed breakdowns by activity type. Potential enhancements to the estimates could include:

- Estimating costs for other waste streams (e.g., industrial, agricultural) and sectors (e.g., Tribes);
- Tracking in more detail the pass-through funding and revenue sources by waste stream to follow dollar flows as they move throughout the system;
- Conducting more detailed and broader estimation of costs associated with moderate risk waste;
- Working with local governments to ensure consistent survey data collection in a manner that necessitates the least burden;
- Including an estimate of the money saved by waste reduction (i.e., how much more would have been spent on disposal without waste reduction, akin to the way that energy utilities may count conservation as a source of additional power generation “capacity”);
- Encouraging WUTC to offer electronic reporting and consider adding several questions relevant to this cost estimation to its annual hauler report form; and
- Developing an estimate of the external costs of solid waste.

The solid waste cost flow data should be updated over time to track how funding sources and needs are changing as Washington makes progress toward its Beyond Waste vision. The data management and analytical tools are already in place, so updating the local government survey with the same level of data could be streamlined. The WUTC hauler data and State government revenues and expenditures could be updated annually. Given the level of effort that the local government surveys required of both respondents and the project team, updating the city, county, and health jurisdiction data less frequently, such as biennially, may be appropriate. Striking the right balance on the frequency of data updates should help support a high response rate. For example, too-frequent surveys may be burdensome for local governments, while long intervals may mean losing institutional memory about how to fill out the form as well as generating less useful data. Simplifying the data collection requests could reduce the effort required and improve the response rate, though the data obtained would be less rich. Some changes are minor (e.g., converting the data collection instruments into Excel forms to facilitate error checking), while others could be more substantial and require corresponding changes to the database (e.g., working with local governments to modify the categories and subcategories). Information collected and lessons learned in 2007 should help pave the way for future updates and continued use of these valuable data on the costs of solid waste management in Washington State.