

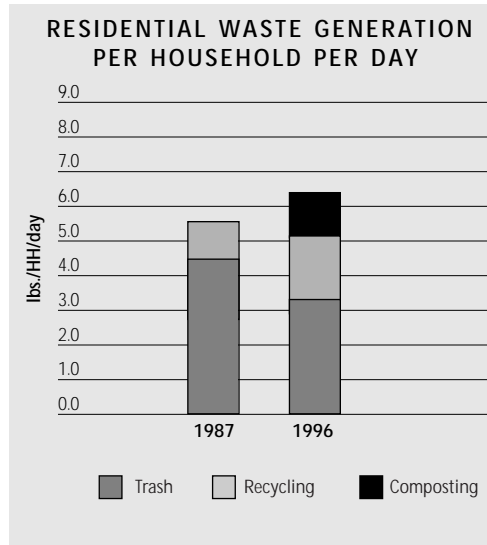
SEATTLE, WASHINGTON

Municipal Solid Waste Reduction

44%

Seattle faced a trash disposal crisis in the late 1980s after two city-operated landfills closed. Disposal fees at the county-operated landfill were nearly three times what city fees had been. Twice, the city considered building a trash incinerator but citizen objections overruled the plans. The city opted to pursue an aggressive waste reduction program, setting a goal of recycling 60% of the waste stream by 1998. In 1996, Seattle approached this goal. It diverted 49% of its residential waste stream, 48% of its commercial waste stream, and 18% of materials delivered to its drop-off sites. Overall diversion was 44% (34% through recycling and 10% through composting). The current system uses city-hired contractors to collect trash, recyclables, and yard trimmings.

Curbside recycling and yard debris systems that divert many categories of materials (including mixed paper), pay-as-you-throw (PAYT) trash rates, comprehensive educational programs, strong private sector recycling promoted by financial incentives, and multi-family recycling service contribute to program success. Seattle's single-family curbside recycling program accepts 16 categories of materials; the apartment program accepts 13. The yard debris subscription service collects four additional materials and three additional categories are accepted at the city's transfer stations. PAYT trash rates encourage residents to divert waste. Many companies provide private sector recycling collection in a free-market environment. Strong local markets (especially for paper and glass) provide outlets for collected materials. In addition, the private sector receives financial incentives to reduce its trash through a commercial hauling fee structure that charges less for source-separated recyclables than trash. More than 40% of Seattle households are located in multi-family units and providing recycling service to these households is a critical element in the city's efforts to maximize diversion.



Source: Institute for Local Self-Reliance, 1999.

DEMOGRAPHICS

POPULATION: 534,700 (1996)
 HOUSEHOLDS: 248,970 total
 units (1996): 149,500
 SFDs (four or fewer units in building), 99,470 MFDs
 BUSINESSES: 45,000
 LAND AREA: 92 square mi.
 HOUSEHOLD DENSITY: 2,706/square mile
 AVERAGE PER CAPITA INCOME: \$18,308 (1989)
 MEDIAN HOUSEHOLD INCOME: \$29,353 (1989), \$28,941 (1995)
 COMMUNITY CHARACTER: Urban, major industries: computer software and hardware, aircraft manufacturing, financial management, insurance, real estate, and tourism
 COUNTY: King

RESIDENTIAL PROGRAM SUMMARY

	1987	1996
Tons Per Year	233,230	288,106
Disposal	188,800	146,773
Diversion	44,430	141,333
Percent Diverted	19%	49%
Recycled	19%	29%
Composted	0%	20%
Average lbs./HH/day	5.61	6.34
Disposal	4.54	3.23
Diversion	1.07	3.11
Annual Disposal Fees		
Disposal	\$11,266,099	\$6,504,749
Net Program Costs/HH	\$155.33	\$154.93
Disposal Services	\$155.33	\$101.14
Diversion Services	\$0.00 ¹	\$53.79

Notes: Figures above represent residential sector collection only. 227,890 households served in 1987, 248,970 in 1996. 1987 dollars adjusted to 1996 dollars using the GDP deflator. Numbers may not add to total due to rounding.

¹Reported 19% recycling in private sector. The city incurred no costs for this recycling.

Source: Institute for Local Self-Reliance, 1999.

Cost-effectiveness of Seattle's waste reduction efforts is due to the city's pay-as-you-throw trash fees and lower per ton costs for recycling and composting as compared to trash disposal.¹ In 1996, per household waste management costs averaged \$155, the same as in 1987. On a per ton basis, total waste management cost \$154 per ton; trash cost \$173 per ton; recycling, \$121 per ton; and composting, \$142 per ton.

WASTE REDUCTION (1996)						
	Private Residential ¹	Curbside Residential ²	Total Residential	Self-Haul ³	Commercial ⁴	Total
Recycled	17,684	64,709	82,393	5,280	172,443	260,116
Corrugated Cardboard	6,204	5,834	12,038	387	96,653	109,078
Mixed Paper	4,459	19,413	23,872	499	31,254	55,625
Newspaper	3,900	24,171	28,071	143	13,351	41,565
Glass	10	12,338	12,348	206	1,989	14,543
Office Paper	3	0	3		13,928	13,931
Miscellaneous	687	0	687	149	11,188	12,024
Ferrous Scrap	0	68	68	2,909	1,160	4,137
Aluminum/Non-ferrous Scrap	725	877	1,602	54	733	2,389
Ferrous Cans	0	1,321	1,321		174	1,495
Plastics	251	635	886	16	693	1,595
Wood	0	0	0	917	1,320	2,237
Textiles	1,445	0	1,445		0	1,445
MRF Rejects	NA ⁵	959 ⁶	NA ⁵		NA ⁵	NA ⁵
Composted/Chipped	19,607	39,333	58,940	12,323	9,119	80,382
Yard Debris ⁷	17,159	39,333	56,492	12,323	3,783	72,598
Food Discards ⁸	2,448	0	2,375		5,336	7,711
Total Waste Reduction	37,291	104,042	141,333	17,603	181,562	340,498
MSW Disposed	0	146,773	146,773	82,240	197,604	426,617
Trash	0	145,814	145,814	82,240	197,604	425,658
Contaminants		959	959			959
Total Generation		250,815	288,106	99,843	379,166	767,144
Percent Reduced		41.5%	49.1%	17.6%	47.9%	44.4%
Lbs. Waste/HH Served/Day			6.34			

Notes: Numbers may not add to total due to rounding.
¹Data are actual tonnage from 1996 and represent material generated by Seattle residents and recovered through private drop-off and buy-back centers. Private recyclers report these data to the state. The state, in turn, reports the tonnages to localities.
²Data represent single-family and multi-family materials collected at curbside.
³Data represent materials delivered in both cars and trucks to drop-off sites. The material originates in both the residential and commercial sectors but is not separable.
⁴Data are actual tonnages from 1996 and represent material generated by Seattle commercial sector and recovered by private recycling companies. Private recyclers report these data to the state. The state, in turn, reports the tonnages to localities.
⁵Materials are processed at many different facilities and the reject rate is impossible to establish.
⁶Seattle Public Utilities reported 898 tons of contaminants in the SFD curbside residential programs, based on a sampling of bins at the curbside. General Disposal reported 62 tons of contaminants from its MFD recycling program. Nuts and Bolts reported recycling tonnages from its MFD recycling program as marketed, i.e. after rejects were removed. The recycling tonnages reported are net of the rejects.
⁷Private residential yard debris represents an estimate of backyard composting and grasscycling. Seattle Public Utilities estimates tonnage based on the number of bins in use and an average recovery rate for each household composting. Seattle staff calculated the average recovery rate per household of 562 pounds based on waste composition studies, composting program evaluations, and surveys of bin users. Self-haul yard debris includes material delivered in cars and trucks. Cars are not weighed and tonnage is estimated based on the number of cars and an average weight of 258 pounds per car. This figure is based on a sampling conducted in 1995.
⁸Private residential food discards represent an estimate of backyard food composting. Seattle Public Utilities estimates tonnage based on the number of bins in use and an average recovery rate for each household composting. Seattle staff calculated the average recovery rate per household of 290 pounds based on waste composition studies, composting program evaluations, and surveys of bin users.

Source: Institute for Local Self-Reliance, 1999.

State and Local Policies

In 1989, the Washington State Legislature passed the "Waste Not Washington Act," which established a waste management hierarchy: (1) waste reduction; (2) recycling with source separation of materials preferred; (3) energy recovery, incineration, or landfilling of separated waste; and (4) energy recovery, incineration, or landfilling of mixed waste. The Act also set a state 50% recycling goal by 1995. The state did not meet this goal but has made

consistent progress toward it; the state calculated recycling rate was 39% in 1995, up from 30% in 1989.

The Act required county governments to prepare solid waste management plans that incorporated waste reduction and recycling. The state provided local governments over \$25 million in grant funds to revise their waste management plans and to implement waste reduction and recycling

programs. The Clean Washington Center was formed to focus on markets for recyclable materials.²

In 1988, Seattle set a goal to recycle 60% of its residential and commercial waste by 1998 with interim goals of 40% by 1991 and 50% by 1993.

A local ordinance, enacted in 1988, prohibits mixing yard debris and trash at the curb or at transfer stations.

Since 1981 Seattle has charged PAYT rates for residential trash collection and disposal. (See table below for rate schedule.)

Source Reduction & Reuse Initiatives

The Seattle Public Utilities promotes home composting. From December 1989 to April 1998, more than 50,000 free and reduced-price home compost bins were distributed to Seattle residents. The program also sponsors free composting workshops, trains volunteers to become Master Composters, and operates the city's "Compost Hotline."

Seattle began its Master Composter program in 1986. Each year city staff choose approximately 25 people to train as Master Composters. Program volunteers are required to perform 40 hours of outreach on composting following their training. Examples of outreach performed include school programs, composting demonstrations to community groups, staffing composting information booths, and writing articles for publication.

The Seattle Public Utilities' Green Neighborhoods program sponsors "Less is More" grants, which fund innovative waste reduction projects in Seattle.



Micro-can and 32-gallon trash can sizes used in Seattle's pay-as-you-throw trash program.

The Seattle Public Utilities encourages grasscycling and has worked with local lawn and garden care retailers to offer demonstrations, discounts, and rebates on mulching mowers.

The Seattle Public Utilities and King County have joined together to sponsor the "Waste Free Fridays" program. On Fridays only, this campaign promotes special discounts that area retailers offer on waste-preventing products and services. Examples of promotions include a copying company that offered discounts on double-sided copies and a shop that offered free coffee to customers who brought their own reusable cups. The Seattle Public Utilities and King County provide education and publicity for Waste Free Fridays.

Residential Recycling Program

In 1996, Seattle recycled 29% of its residential waste.³ The Seattle Public Utilities contracts with Recycle America and Recycle Seattle to provide

1996 PAY-AS-YOU-THROW TRASH COLLECTION RATES

	Collection Frequency	Cost	Billing Period
12-Gallon Micro-Can	Weekly	\$10.05	Monthly
19-Gallon Mini-Can	Weekly	\$12.35	Monthly
32-Gallon Can	Weekly	\$16.19	Monthly
2 32-Gallon Cans	Weekly	\$32.15	Monthly
Additional 32-Gallon Cans	Weekly	\$16.10	Monthly
Curbside Yard Debris	Varies	\$4.25	Monthly
Self-Haul Trash, Carload	As Needed	\$8.50	Per Trip
Self-Haul Trash, Truckload	As Needed	\$93.65	Per Trip
Self-Haul Yard Debris, Carload	As Needed	\$6.50	Per Trip
Self-Haul Yard Debris, Truckload	As Needed	\$68.70	Per Trip

CURBSIDE COLLECTION OF RECYCLABLES

Service Provider:	The Seattle Public Utilities contracts with two private haulers to serve residences with up to four units: north section, Recycle America (RA); south section, Recycle Seattle (RS). Four private recyclers service apartment buildings: north section, Nuts 'n' Bolts Recycling (N&B) and General Disposal (GD); south section, West Seattle Recycling (WSR) and Recycle Seattle II (RSII). Total Reclaim collects large items for the entire city.
Start-up Date:	Curbside program began February 1988; apartment program May 1989. N&B (May 1989), WSR (January 1991), GD (July 1993), RSII (July 1993)
Mandatory:	No
Households Served:	54,899 average MFDs for 1996; 148,300 SFDs. SFD curbside program includes dwellings with up to four units, remainder in apartment recycling program. Building management sign up their buildings for participation in the MFD program
Materials Accepted:	SFDs: ONP, OCC, RMP (including catalogs, magazines, mail, paperboard, phone books, paperback books, office paper, and paper bags), glass bottles and jars, aluminum and tin cans, PET & HDPE bottles, ferrous metals, white goods MFDs: Aluminum and tin cans, glass bottles and jars, RMP, ONP, white goods. GD & RSII also collect #1 and #2 plastic bottles.
Collection Frequency:	SFDs: North section of city, weekly; south section, monthly. MFDs: Varies, building works with collector to arrange a schedule. White goods and other bulky items collected on-call for a \$25 per item fee.
Set-out Method:	North: Residents set out three 12-gallon bins: yellow bin for cans, bottles, and jars; dark green bin for newspaper; light green bin for mixed paper and OCC. A small cardboard box next to the bins can be used for scrap metal. South: Most materials are commingled in 60- or 90-gallon totes with a separate (approximately 15-gallon) bin for glass. MFDs: Residents served by RSII and GD commingle recyclables in a dumpster, with three totes for collection of glass by color. N&B and WSR provide separate containers for each material category. Collection contractors provide all bins, dumpsters, and totes as part of their contracts.
Collection Method:	SFDs: north section of city: compartmentalized recycling trucks. South: Rear-loading packer trucks, retrofitted with bins for glass, driver sorts glass by color en route. MFDs: GD and RSII collect dumpsters using an automated truck. RSII collects glass on the same truck as commingled materials. GD collects glass in a separate three-compartment side-loading truck. N&B and WSR collect each material on its own route in a separate truck. N&B uses flat-bed trucks to collect material in 55-gallon barrels. WSR collects in a rear-load packer truck.
Participation Rate:	Proportion of eligible households signed up: >90% of SFDs (estimate). In 1996, 43% of MFD buildings (56% of units).
Participation Incentives:	Reduced trash fees through increased diversion
Enforcement:	SFDs: north section of city, improper materials left in recycling bins with a notice explaining problem. South section of city, recyclables in totes with noticeable contamination are not collected, notice explaining left with tote. Haulers are supposed to report to the city the number and location of notices given. On average, the city receives reports of less than one notice issued per day. MFDs: Seattle tries to use an incentive program to encourage recycling rather than enforcement. The city has sponsored reward programs for recycling achievement and maintains an on-going education program about the apartment recycling program. In cases of consistently contaminated recyclables at an apartment building, recycling service has been terminated as a last resort. Service has been terminated at between 50 and 100 buildings.

CURBSIDE COLLECTION OF YARD TRIMMINGS

Start-up Date:	1989
Service Provider:	Contractors hired by city. North section of city: General Disposal; south section of city: US Disposal
Households Served:	85,294 subscribers as of December 1996
Mandatory:	Yes, banned from disposing with trash
Materials Collected:	Leaves, grass clippings, prunings, holiday trees, brush
Collection Frequency:	South: Every other week March-November, monthly December-February; north: Weekly March-October, two November collections, monthly December-February. No more than twenty 60-pound bags, cans, or bundles will be collected from a household in a month, maximum number of units per collection is twenty divided by the number of collections in a month.
Set-out Method:	All material must be either in a paper or plastic bag, a can separate from trash, or tied with twine. Holiday trees must be trimmed down to less than 6' long by 4' across and bundled. Participants must provide their own clearly marked containers.
Collection Method:	Rear-loading trash trucks, drivers remove material from plastic bags. Contractors use one or two person crews and seasonally change the number of routes.
Participation Rate:	NA
Participation Incentives:	Reduced trash fees
Enforcement:	Trash crews do not collect trash containing yard debris. The crews leave a notice explaining why the material was not collected. On average, the city receives reports of less than one notice issued per day.

DROP-OFF COLLECTION

Number of sites:	Two public recycling and yard debris drop-off centers at the city's transfer stations. Numerous other private-sector drop-off and buy-back recycling centers exist throughout the city.
Staffing:	Always present at transfer station facilities
Service Provider:	Seattle Public Utilities
Materials Accepted:	Newspapers, mixed paper, corrugated cardboard, glass, aluminum and tin containers, plastic bottles, white goods, scrap metal, lead-acid batteries, used motor oil, oil filters, brush, clean wood, grass clippings, leaves, holiday trees (free drop-off first two weeks of January)
Participation Incentives:	Reduced trash disposal fees through increased waste reduction, yard debris and clean wood tip fees are lower than trash tip fee and recycling is free
Sectors Served:	All, anyone can use the sites if fees are paid. Seattle Public Utilities staff believe fewer people come into the city to manage these materials than city residents who go out of the city to the county transfer stations at the city's edge. Prior to January 1, 1997, tip fees for trash and yard debris were cheaper for cars and trucks at the county site.

recycling services to its residents living in buildings with four or fewer units. The city contracts with four other companies to provide a separate apartment recycling program serving residents in buildings with five or more units.

Seattle is divided into north and south sections and its curbside recycling program is different in each section. Recycle America (a Waste Management, Inc. owned company) provides curbside recycling services in the north section. Recycle Seattle (owned by Rabanco, a local waste management company) serves the southern section. Four private contractors (Nuts 'n' Bolts Recycling, General Disposal, West Seattle Recycling, and Recycle Seattle II) offer apartment recycling

collection services to buildings with five or more units.

Recyclable materials collected through the city's residential collection programs are processed at two private facilities: the Rabanco Recycling Center and the Recycle America Processing Center. The Rabanco Recycling Center (capacity 500-700 tons per day) processes recyclables from Recycle Seattle's residential collection program, from General Disposal's and Recycle Seattle II's MFD recycling programs, and from commercial sources. The facility uses conveyors, trommel and disc screens, magnetic separation, air classification, and hand-sorting to separate materials. The Recycle America Processing Center (capacity 350 tons per day) processes material



Curbside recycling set-out in north section of city. Residents receive weekly collection of materials.



Curbside recycling set-out in south section of city. Residents receive monthly collection service.

EQUIPMENT COSTS

Item	Cost	Use	Year Incurred
14 Busby Truck Chassis ¹	\$462,000	Trash Hauling	1994-1996
14 Kenilworth Semi-Trucks ²	\$1,140,000	Trash Hauling/Yard Debris	1989-1996
29 Star Trailers ³	\$1,305,000	Yard Debris Hauling	1985-1996
2.75-cubic-yard Caterpillar Wheel Loader	\$150,000	Trash	1995
4 Pettibone Walking Floor Trailers ⁴	\$480,000	Recycling/Composting	1979-1995
2 2.75-cubic-yard Caterpillar Track Loaders	\$350,000	Trash	1994
Ace Diesel Fuel Tank	\$13,000	Trash/Recycling/Composting	1994
2 Case Bulldozers	\$350,000	Trash	1993
7 DeWalt Self-Dumping Hoppers	\$7,000	Recycling	1992
2 1/4-cubic-yard Toyota Skid Steer Loaders	\$40,000	Trash	1992
2 Peterbilt Ecology Trucks	\$240,000	Recycling/Trash	1989, 1992
45 Drop Boxes ⁵	\$180,000	Recycling/Trash	1985-1992
2 Amfab Compactors	\$1,400,000	Trash	1991
2.5-cubic-yard Caterpillar Track Loader	\$175,000	Trash	1991
2 Komatsu Clamshell Backhoes	\$160,000	Recycling	1991
2 1/2-cubic-yard Case Wheel Loaders	\$120,000	Recycling/Composting	1990
2 Ottawa Yard Goats	\$130,000	Trash/Composting	1990
2 Cardboard Compactors ⁶	\$40,000	Recycling	1986, 1989
2 Cardboard Drop Boxes ⁷	unknown	Recycling	1986, 1989
Athey/Broom Street Sweeper	\$125,000	Transfer Station Site Maintenance	1988
GMC Step Van	\$35,000	Trash/Recycling/Yard Debris	1987
Toro Lawn Mower	\$19,000	Transfer Station Site Maintenance	1987
Ford Flatbed Truck	\$50,000	Trash/Recycling/Yard Debris	1986
1 King LowBoy	\$75,000	Equipment Hauling	1985
Ford Flusher Truck	\$110,000	Transfer Station Site Maintenance	1985

Notes: All costs represent 1996 replacement costs. Listed equipment is owned by Seattle Public Utilities and is primarily used in the operation of its transfer stations and for hauling of materials.

¹Ten purchased in 1994; two in 1995; and two in 1996.

²Four purchased in 1989; five in 1991; one in 1992; two in 1994; two in 1995; and two in 1996.

³Three purchased in 1985; nine in 1987; four in 1988; ten in 1990; one in 1995; and two in 1996.

⁴One purchased in 1979, 1980, 1981, and 1995.

⁵Two purchased in 1985; one in 1988; 23 in 1989; and 19 in 1992. Those purchased in 1992 are DeWalt; all others are Capital.

⁶Marathon Compactor purchased in 1986; Masterpak Compactor in 1989.

⁷Marathon box purchased in 1986; Masterpak box in 1989.

Source: *Institute for Local Self-Reliance, 1999.*



Recycling truck servicing north section of city.

collected by Recycle America from the north end of Seattle. Paper is hand-sorted and baled. Magnets and hand-sorting are employed to separate glass, tin, and aluminum. Nuts 'n' Bolts Recycling and West Seattle Recycling collect materials already separated and deliver them directly to markets.

Total Reclaim provides bulky waste collection to all residents who request the service. Residents must pay \$25 for each item collected. The city pays an additional \$10 for each item collected and pays for material processing. Appliances collected by Total Reclaim are recycled.

Commercial Recycling

Commercial and institutional waste generators can self-haul their trash and recyclables to a transfer

station or contract privately for trash and recycling collection. Businesses that self-haul recyclables to city transfer stations can tip them for free. At city transfer stations, the per ton tip fee for a load of yard debris is 25% lower than the tip fee charged for trash. Private trash haulers offer their commercial customers separate recycling service for source-separated materials. The rate schedule for recycling is generally lower than for trash service. In addition, trash haulers and recycling companies sometimes pay businesses for high-value recovered materials. A number of private recycling companies provide collection service. These companies range from local paper companies collecting only high-grade paper to companies collecting a broad range of materials. Seattle excludes revenues from collection of commercial recyclables from the city Business and Occupation Tax that haulers must pay on trash collection revenues. In 1996, Seattle diverted 48% of its commercial and institutional waste through private recyclers, up from 44% in 1989 and 1993.

The Seattle Public Utilities and the Greater Seattle Chamber of Commerce sponsor the Business and Industry Recycling Venture (BIRV). This program encourages waste prevention, recycling, and purchasing of recycled-content products within Seattle's business community. BIRV offers businesses a hotline, informational materials, and technical assistance; and conducts presentations and seminars.

Composting Program

Seattle residents can choose to divert yard debris either through curbside subscription service (for which the city charges a \$4.10 per month fee), through drop-off sites, or by home composting. A local ordinance prohibits disposal of yard debris with trash. Residents' trash haulers (General Disposal on the north side of the city and US Disposal in the southern portion), as part of their contracts with the city, provide the curbside yard debris service for subscribers on the same day as trash collection. In 1996, Seattle diverted 14% of its residential waste stream (excluding self-haul residential waste) through the subscription program and an additional 7% of its waste stream through backyard composting. General Disposal delivers collected materials to one of the city-owned transfer stations. US Disposal transfers material collected in the curbside and drop-off programs to the Cedar Grove processing facility located in rural Maple Valley, 30 miles from Seattle.

Cedar Grove composts both yard and food debris at this site. Cedar Grove composts the material in mechanically turned windrows. Finished compost is sold through local retail outlets in the Puget Sound area.

The Cedar Grove composting facility has experienced some odor problems and is facing potential court action from its neighbors. In order to address this problem, Cedar Grove is constructing a covered grinding area and diverting some materials (particularly grass clippings) to small independent composters.

Education, Publicity, and Outreach

The Seattle Public Utilities sponsors the "Informed Neighborhoods" programs aimed at spreading information about waste management to members of the community. This program has two main components, the "Friends of Recycling" and a school grant program. Friends of Recycling provides free training to residents interested in serving their neighborhood for one year as a community resource on Seattle Public Utilities' waste programs. The volunteers share information on recycling, waste reduction, and composting. The school grants program provides money to elementary through high schools to fund development of solid waste class projects.

The Seattle Public Utilities has worked with King, Pierce, and Snohomish Counties on a grasscycling campaign. The campaign featured television advertisements promoting grasscycling and distribution of coupons for rebates on mulching mowers.

Twice a year the Seattle Public Utilities produces and direct mails to all residential



Yard debris containers set out for collection.

households a newsletter, called The Curb Waste News. The city also distributes information concerning its waste management programs through utility bill inserts.

The Seattle Public Utilities maintains a Web site with information about waste management programs, such as recycling preparation guidelines, transfer station hours, locations, and fees, and the numerous informational and grant programs it supports. Also presented are solid waste and recycling data, market prices, waste composition data, and other general planning information.

Costs

City contractors perform many public sector waste management functions in Seattle. Seattle pays per ton contract fees for curbside collection and processing of recyclable materials from single- and multi-family residences, curbside collection and processing of yard debris, and residential trash collection and disposal. The city incurs no direct capital costs for these activities, rather contractors pass on capital costs in the form of fees. City staff's main functions are operating two transfer stations, performing closure of the city's old landfill, hauling trash to the railhead, providing education and publicity, performing data analysis, providing customer service and billing for the residential waste management programs, performing waste inspections, and providing contractor oversight. The Seattle Public Utilities employs 190 people in its waste management programs.

The city paid an average of \$173 per ton for residential trash services and \$129 per ton for residential waste reduction (recycling, \$121 per ton; composting \$142 per ton) in 1996. Total residential waste management cost over \$38.5 million, for an average per household cost of \$155 (\$31 for recycling services, \$22 for the composting program, and \$101 for trash management). In comparison, in 1987, the city paid \$187 per ton for trash collection and disposal, averaging \$155 per household.

Funding & Accounting Systems

Funds for Seattle Public Utilities' solid waste management programs are raised through the monthly rates paid by residential customers, tip fees paid at transfer stations, tip fees paid at the railhead for Institutional/Commercial trash, solid waste taxes, and through state grants. The grants average

\$300,000 per year. Revenues from the sale of recyclables can partially offset the per ton fees contractors charge the city.

Seattle Public Utilities uses accrual accounting techniques to track solid waste management costs.

Future Plans and Obstacles to Increasing Diversion

A 1995 study estimated more than 50,000 tons of residential materials and 60,000 tons of commercial materials that could be recycled in the city's existing programs were disposed. Most of the recoverable material was cardboard and other paper. The study estimated that residents of multi-family dwellings could recycle nearly half of the material they disposed and that self-haulers, single-family residents, and businesses could have recycled nearly one-third. The city is planning to initiate an intensive educational campaign in the residential and commercial sectors targeting paper recovery as a prelude to potential bans if new sector specific recovery goals are not met.

Obstacles to increasing diversion in MFDs include limited space in apartments and common areas for storing recyclables and lack of the financial incentive of PAYT rates to encourage trash reduction.

The Seattle Public Utilities is currently engaged in a comprehensive planning process. All of the city's waste management contracts expire in March 2000 and city planners are considering adding small businesses to the curbside recycling program and allowing contractors to propose innovative collection systems, such as dual-collection of waste streams, among many possible options. Other potential program changes include adding collection of food discards, polycoated paper, and all plastics to the curbside recycling program.

The Seattle Public Utilities may need to find a new facility to accept compostable materials. Cedar Grove is facing a class action lawsuit brought by neighboring residents. Residents want the facility to close because of persistent odor problems.

A current focus of Seattle's source reduction program is promotion of the concept of "voluntary simplicity." The city has contracted with a consultant for the development of educational materials intended to reach diverse audiences.

RESIDENTIAL CURBSIDE WASTE REDUCTION PROGRAM COSTS (1996)

	Cost	Tons	Cost/Ton	Cost/HH/YR
Recycling Gross Costs	\$7,815,196	64,709	\$120.78	\$31.39
SFD Curbside Collection and Processing ¹	\$4,926,729	56,416	\$87.33	
Apartment Collection and Processing ²	\$932,542	8,293	\$112.46	
Administration/Education/Publicity ³	\$1,955,924	64,709	\$30.23	
Composting Gross Costs	\$5,577,806	39,333	\$141.81	\$22.40
Yard Trimmings Collection ⁴	\$3,109,239	39,333	\$79.05	
Transfer Station Costs ⁵	\$170,169	27,491	\$6.19	
Yard Debris Hauling ⁶	\$313,947	27,491	\$11.42	
Yard Trimmings Processing ⁷	\$479,863	39,333	\$12.20	
Administration/Education/Publicity ³	\$1,504,588	39,333	\$38.25	
Waste Reduction Gross Costs	\$13,393,001	104,042	\$128.73	\$53.79
Materials Revenues⁸	NA		NA	NA
Net Waste Reduction Costs	\$13,393,001	104,042	\$128.73	\$53.79

Key: NA = not applicable

Note: Figures may not total due to rounding.

¹Represents net contract payments by city to contractors. The city paid its contractors on a per ton basis (\$93.08 per ton in the north section of the city and \$86.42 in the south section) with per ton offsets based on market prices.

²Apartment recycling collection contracts are based on a per ton rate for collection and include provisions for the contractor to return revenues if commodity prices rise above a set base price and for the city to pay extra to the contractors if commodity prices fall below a set level. Figures represent net contract payments by city to contractors.

³Represents costs of city administration of program based on a 1995 study plus a pro-rated amount of city expenditures for general and administrative costs, depreciation, and taxes. The cost figures from the study include costs for customer service, education, planning, inspectors, and contract administration staff only. The general and administrative costs include rent, utilities, departmental overhead, information technology, and overhead for other city government departments including the mayor and council.

⁴Represents contract payments by city to contractors for collection of yard debris.

⁵Represents costs for handling yard debris collected from the north of the city at transfer stations. City staff calculated per ton costs in a 1995 study.

⁶Represents costs for hauling yard debris collected from the north of the city to the Cedar Grove compost facility located in Maple Valley, 30 miles from Seattle. City staff calculated per ton costs for a 1995 study.

⁷Represents payments to contractor for processing yard debris at \$12.20 per ton.

⁸Contracts include complicated formulae for (1) reducing charges to the city if commodity prices are above a pre-set level and (2) increasing amounts due if prices fall below a set level. The per ton base rates and commodity prices vary among contractors. Recycling collection costs presented above represent net contract payments and as such include any offsets from revenues earned or lost.

TOTAL RESIDENTIAL CURBSIDE WASTE MANAGEMENT COSTS (1996)

	Cost	Tons	Cost/Ton	Cost/HH/YR
Trash Gross Costs	\$25,180,317	145,814	\$172.69	\$101.14
Trash Collection ¹	\$10,909,771	145,814	\$74.82	
Trash Transfer Station ²	\$1,010,489	145,814	\$6.93	
Hauling ³	\$420,647	145,221	\$2.90	
Large Item Collection ⁴	\$4,340	NA	NA	
Railhead Tip Fees ⁵	\$6,504,749	145,814	\$44.61	
Administration/Education/Publicity ⁶	\$6,330,321	145,814	\$43.41	
Waste Reduction Gross Costs	\$13,393,001	104,042	\$128.73	\$53.79
SWM Gross Costs	\$38,573,318	249,855	\$154.38	\$154.93
Materials Revenues	NA		NA	NA
Total SWM Net Costs	\$38,573,318	249,855	\$154.38	\$154.93

Key: NA = not applicable

Note: Figures may not total due to rounding. Trash tonnage figure above is different than figure in table, page 141, as figure above excludes MRF rejects.

¹Represents contract payments by city to contractors.

²Represents costs to city for trash handling at city transfer stations. Per ton costs were calculated in a 1995 city study. This study revealed per ton operation and maintenance costs at city transfer stations for handling trash averaged \$6.93 plus \$0.97 per ton for capital costs.

³Represents cost to city for trash hauling from transfer station to railhead. City staff calculated per ton costs in a 1995 study to be \$3.79 per ton hauled from the north transfer station and \$2.39 per ton hauled from the south transfer station.

⁴Represents costs to city for bulky item collection in residential sector. This service is provided by a contractor, Total Reclaim, at a cost of \$10 to the city and \$25 to the resident for each item collected. Total Reclaim performed 124 bulk item collections in 1996. Some of this material is recycled, particularly white goods. Tons recycled versus disposed are not tracked but are included in the recycling and disposal tonnage totals.

⁵Represents tip fees paid to tip trash at a railhead. Costs include rail transport and tipping at a landfill in Eastern Oregon.

⁶Represents costs of city administration of program based on a 1995 study plus a pro-rated amount of city expenditures for general and administrative costs, depreciation, and taxes. The cost figures from the study include costs for customer service, education, planning, inspectors, and contract administration staff only. The general and administrative costs include rent, utilities, departmental overhead, information technology, and overhead for other city government departments including the mayor and council.



Tips for Replication

Recover mixed paper for recycling.

Distribute bins to all participants when starting waste recovery programs.

Institute PAYT rates for trash service.

Invest in public education programs.

Target educational messages to people of all ethnicities.

Support education programs with market research to most efficiently target resources.

Accept some or all the risk of secondary materials prices by paying contractors more when market prices are low and less when prices are high.

Pay trash haulers partly based on tons collected so as recycling increases, savings result.

Notes:

¹All of Seattle's waste management contracts are based on per ton fees, therefore each ton of material handled in the recycling or composting programs results in a lower cost than if materials had been disposed as trash.

²The Clean Washington Center was initially funded by the state. In 1997, state funding ended but the Center has continued to operate with private funding.

³This figure represents residential trash and recyclables handled by private recyclers and city curbside programs. Some materials self-hauled to city transfer stations are residential in origin but the residential versus commercial split is unknown.

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