

APPENDIX TO

REFUSE AND RECYCLING: COMPARING THE COSTS

MEASURING THE COST OF GARBAGE

The Department of Sanitation’s internal analysis of its 2002 expenses provides the raw data for our examination of the costs of refuse management and recycling. DOS uses an activity-based costing method for this analysis. ABC is an approach borrowed from the private sector that assigns costs to end products or functions based on the resources they consume. DOS assigns cost to three principal functions: refuse collection and disposal; recycling; and cleaning. Two other functions are paid and free disposal and snow removal.

Activity-based costing is intended to account for all city budgetary resources consumed in providing these functions, whether borne by the department’s budget directly or paid for elsewhere in the city budget. The resources consumed in managing one ton of material include not only the direct wages paid and equipment used to pick up, transport, and dispose of the material, but also the overhead costs of administrators’ and managers’ salaries, of lighting and heat in DOS garages and offices, and of interest accrued on bonds sold earlier to fund construction of DOS facilities. This results in so-called fully loaded costs. The department uses ABC to analyze its expenditures and for long-term planning purposes.

Allocating Costs. Since activity-based costing measures the totality of resources consumed, it captures direct and indirect as well as fixed and variable costs. Direct costs are those incurred in performing the department’s functions. The cost of running

collection and street-sweeping trucks, for example, are direct costs of the collection and cleaning functions, respectively. Processing fees paid to private recyclers to whom city garbage trucks deliver metal, glass, and plastic recyclables are direct costs of the recycling function. In general, direct costs are usually variable costs; that is, the total cost varies as a function of the quantity of the service provided: tons of garbage collected; miles of streets cleaned; inches of snow removed.

Indirect costs are costs associated with, or allocated to, one of the four functions, but which are not directly created by the performance of the function. Indirect costs include support functions such as building management; the department’s administrative functions such as payroll, planning, legal affairs, and the like.

Indirect costs are most often fixed, at least in the short run; that is, they do not vary as a function of the quantity of a particular function. The costs the department pays to administer export contracts—administrators’ salaries, utility bills for their offices—are incurred no matter what price per ton is paid to export our waste.

Debt service costs for department facilities and equipment must be paid whether a particular facility is used or left vacant.

Allocating indirect and fixed costs are key to the activity-based costing methodology. Overhead, support, and administrative costs are assigned to each function based on particular criteria. To illustrate: The Sanitation Commissioner does not directly perform any of the four department functions; his salary is therefore an overhead cost. How should it be allocated? In theory, one could ask “central office” personnel to keep timesheets; or one could interview them to determine how much time they spent on each function. Even this might be

difficult to answer, since some activities performed by central office administrators may be global in nature—strategic planning, for example, or reviewing personnel policy. In the absence of direct knowledge of how to allocate these costs, therefore, some rules must be developed to help.

Many of the department’s overhead costs are allotted in proportion to the number of uniformed sanitation workers assigned to a particular function. Each daily sanitation worker shift is referred to as a post. The number of posts required to perform a particular function measures the amount of labor expended on refuse, recycling, and other functions. In 2002, the number of average daily uniformed

Total City Budget Cost of Department of Sanitation Functions			
<i>Dollars in millions</i>			
	PS	OTPS	Total
Dept. of Sanitation by Function			
Collection (Non-Recycling)	\$355.7	\$264.4	\$620.1
Cleaning	101.0	24.1	125.1
Recycling	145.5	40.3	185.8
Paid/Free Removal	1.6	9.7	11.3
Snow Removal	6.3	7.5	13.8
Total Dept. of Sanitation	\$610.1	\$345.9	\$956.1
Fringe Benefits	142.6	--	142.6
Debt Service	--	123.1	123.1
TOTAL	\$752.7	\$469.1	\$1,221.8

SOURCES: IBO; Department of Sanitation.
 NOTES: PS: Personal Services (labor); OTPS: Other Than Personal Services (non-labor).

posts required for refuse collection was about 2,100, compared to 900 for recycling. Another 520 posts were assigned to cleaning functions, including street cleaning and basket collections, on an average day. Department support functions accounted for the remaining 620 average daily uniformed posts.

DOS also allocates overhead costs by tonnage in some instances. That is, they apportion some costs based on the percentage of tons of recyclables versus tons of refuse handled in a given operation—vacant lot cleaning operations, for instance. The department uses several other allocation methods for their activity-based costing exercise. These are discussed below where applicable.

COST PER TON

The table 2002 Sanitation Costs per Ton details the components of the fully loaded costs per ton of recycling and refuse.

Collection. The cost of refuse collection was reported in the 2003 *Mayor’s Management Report* as \$152 per ton, and that of recycling as \$280 per ton. Certain collection activities are common to both refuse and recycling. These are summed up in the subtotal row of the 2002 costs table. Most of the total cost of collection is for labor (83 percent of the table’s subtotal row.) Direct collection costs account for \$85.53 per ton for refuse and

\$142.60 per ton for recycling. This is the cost of running garbage trucks each day to pick up refuse and recycling, and includes relays—driving collection trucks from the end of the collection route to transfer stations. Labor, including wages and salaries as well as fringe benefits (such as health insurance and social security contributions) account for 99 percent of direct collection costs. Non-labor costs are a relatively small component of costs in this category (only \$1.02 per ton).

The reason for this disparity lies in the relative productivity of collection, measured by average tons collected per truck shift, as discussed in the main body of the paper. Since all other collection-related costs common to both recycling and refuse are allocated based on the costs of direct collection, this productivity differential is at the core of why recycling is more expensive per ton than refuse.

“Field support” costs are also directly associated with truck shifts run to collect refuse and recycling. Field support functions are also predominantly labor, consisting of uniformed workers supporting truck shifts by preparing trucks and equipment before shifts, transporting equipment, filling up trucks with gas, and other duties. As with direct collection, collection field support contains only a small non-labor portion (\$0.18 per ton for refuse).

“Administrative” expenses account for 9 percent of the cost of collection, and are allocated for the most part on the basis of the share of sanitation worker posts assigned to each of the two functions. These general administrative costs include legal expenses and operations management of the logistics of collection. A portion of the salaries of the Sanitation Commissioner and other central and borough office staff are included in this total.

“Collection technical support” costs (14 percent of collection cost) include support operations such as building maintenance, motor equipment maintenance, staff training, support operations engineering, and refuse and recycling pick up at public housing developments. Technical support activity costs are allocated principally on the basis of the number of posts, but the costs of maintaining motor vehicles is based on the percentage of vehicles used for refuse or recycling collection.

For both refuse and recycling operations, the allocated overhead costs included under “administration and technical support represent the same proportion of collection costs (including field support): 35 percent. *Collection Costs Unique to Recycling.* Three items were

2002 Sanitation Costs per Ton		
	Refuse	Recycling
Collection		
Direct collection	\$85.53	\$142.60
Collection field support	14.94	24.74
Administration	14.16	19.86
Collection technical support	21.27	29.18
Subtotal	\$135.90	\$216.38
Non-collection tech support	--	9.95
Enforcement	--	10.80
SWP/BWPRR	--	14.15
Debt service	15.73	28.95
Total, collection	\$152	\$280
Disposal/Processing		
Contract fees	\$64.81	\$24.36
Non C&C recyclables disposal	--	0.34
Export contract administration	2.62	--
Admin & technical support	19.74	--
Fresh Kills closure	4.71	--
Debt service	13.98	--
Total, disposal/processing	\$105	\$25
Total Cost per Ton	\$257	\$305

SOURCES: IBO; Department of Sanitation.
NOTE: Individual rows may not add to totals due to rounding.

included in the calculation of recycling's collection cost per ton that are not part of the refuse calculation. First, the cost of enforcement is divided between DOS's recycling and cleaning functions, with none to refuse. Based principally on the number of personnel assigned to enforcement of sanitation and recycling laws, just under half of the \$11.7 million in 2002 enforcement costs were included in the calculation of recycling's cost per ton. In DOS's methodology, this does not include any offsetting fine revenue.

Second, the activities of the "Bureau of Waste Prevention, Reuse, and Recycling" are also unique to recycling, and accounted for \$14 per ton in 2002. BWPRR is responsible for the planning and programmatic administration of the city's recycling operations. Separate from the administration of curbside collection operations (included in "Administration," above), BWPRR runs the numerous other facets of the city's recycling program. These include waste prevention, public education and outreach, leaf and yard composting, composting at Rikers Island, self-help/drop-off operations, and CFC recovery.

Third, certain technical support costs are unique to recycling, including functions like composting and operating the 59th Street marine transfer station (used for barging paper to Visy paper mill on Staten Island). DOS receives a payment from Visy for the use and operations of this marine transfer station. This revenue is not reflected here. Also allocated to recycling is 11.4 percent of the department's lot cleaning expenditures, based on tonnage gathered. (The remaining 88.6 percent of lot cleaning expenditures are allocated to DOS's cleaning function, and are not included in refuse collection. They are included, however, in the disposal total tonnage and the calculation of the disposal cost per ton).

"Debt service" costs of collection in 2002 were equal to \$15.73 per ton for refuse and \$28.95 per ton for recycling. This is the principal and interest paid on bonds issued by the city to construct and renovate facilities such as vehicle repair shops and garages necessary to run the department's daily collection operations, and to purchase equipment such as collection vehicles. Debt service for trucks used for both the recycling and refuse collection functions are assigned based on the number of trucks used in each function. Debt service for facilities is assigned based on the number of posts assigned to each function. Certain debt service costs for recycling facilities, including composting facilities, self-help lots, and derelict vehicle removal equipment and storage, are included in the recycling debt service figure.

Refuse Disposal. Forty-one percent of the cost of managing

refuse in 2002 resulted from disposal. The city paid \$352 million to dispose of its waste. (Reported in the Mayor's Management Report as \$105 per ton, the figure used here is closer to \$106 because it is based on a slightly different total volume of material than the total cost per ton. The management report figure was calculated using the total volume of refuse DOS disposed of in 2002—3.4 million tons. This included the 3.1 million tons collected from city residences, as well as roughly 300,000 tons of refuse collected through lot cleaning and street sweeping operations, discarded bulk materials from households, and waste generated by city and state government agencies, among other sources.)

The largest component of the disposal cost is the export contracts. In 2002, DOS paid an average of \$65 per ton to private haulers to take away New York City's trash. This includes tipping fees for out-of-state landfills as well as truck transport of the refuse. Recent contract renewals have included prices as high as \$76 per ton, and the average cost is likely to rise to \$69 per ton for 2004 and \$71 per ton in 2005.

The remaining roughly \$40 per ton attributed to disposal are costs that are fixed, at least in the short run. "Administration of the export program and contracts" cost almost \$3 per ton in 2002. "Other disposal-related costs" totaled \$20 per ton. These included legal, engineering, and solid waste planning functions, among others allocated to the disposal function. DOS also continues to incur costs at the closed Fresh Kills site, including for the capture of methane gas and to prevent contamination of surrounding soil and groundwater sources, which contributed \$4.71 per ton to the total cost of disposal. Finally, debt service costs relating to disposal equaled approximately \$14 per ton. Debt service was incurred for the construction and reconstruction of the city's marine transfer stations and facilities as well as for landfills and incinerators no longer in use.

Recycling Processing Costs. Comparable to disposal on the refuse side, "processing fees" accounted for \$24 per ton in 2002. Negotiated by BWPRR, the city paid \$19.4 million that year to recycling companies for accepting 330,000 tons of metal, glass, and plastic collected from city residents and institutions. The 406,000 tons of paper collected by DOS workers in 2002 were a source of revenue for the city, netting \$7 per ton on average. This revenue was not included in the cost-per-ton calculation. Its inclusion would reduce the average cost per ton of recycling by approximately \$4, to \$301 per ton.

A small cost allocation (\$0.34) for "disposal" is also assigned to recycling. This is based on non-curbside recycling tonnage (i.e. leaf and yard waste, lot cleaning tonnage, etc).