

The cost of commercial recycling collection

by Barbara Stevens

Recycling in the commercial sector is highly correlated to economic incentives.

Most local governments in the United States have more direct involvement in regulating residential solid waste than they do regulating commercial solid waste. As a result, local governments know much more about waste generation, waste composition, recycling rates and program costs in the residential sector than in the commercial sector.

The typical institutional arrangement for commercial waste and recycling collection is basically free market competition, with each generator free to contract individually with any licensed hauler. This arrangement, which we call the subscription arrangement, does not involve the local government in any significant way.

Although subscription arrangements are most common in the commercial sector, they are rare in the residential sector, which is dominated by municipal, contract and franchise collection. In any of these latter arrangements, the local government typically has access to data indicating the quantities of recyclables and waste collected, the costs of the program and the number of customers.

With the subscription arrangement for the commercial sector, however, it is unusual for the local government to have access to any of these data items.

Local governments are increasingly subject to state or local recycling goals or mandates. Often, such targets represent a significant portion of the waste stream - targets or mandates of 25 to 50 percent are not uncommon. To achieve such recycling percentages, it is necessary to consider the commercial sector as well as the residential sector.¹ New commercial recycling programs, however, cannot be effectively designed in the absence of information about existing waste collection and recycling activities in the commercial sector.

This article describes methods used by several local governments to obtain data about the commercial sector. Some results are presented from these data gathering efforts, and analysis is offered to indicate the validity of generalizing results from one community to another.

Obtaining data

In communities with subscription arrangements for commercial waste and recycling collection, there are typically only two sources of information about the commercial sector:

the licensed haulers and the generators. Communities with franchise or contract arrangements for commercial waste collection may be able to obtain much information.

Obtaining data from haulers requires an independent survey effort. Usually, all haulers licensed to operate in a community are surveyed. These haulers can report items such as number of vehicles (by type of vehicle) dispatched per day and per week in the community (and excluding vehicles dispatched outside the community), number of customers in the community, average tons per load by type of vehicle and average prices charged for specific types of services (1). Ecodata has recently conducted hauler surveys in San Diego; Montgomery County, Maryland; and Philadelphia.

Generators can provide useful data, to be used independently or to corroborate data provided by haulers. Here again, an independent survey effort is required. Typically, all the commercial sector generators cannot be surveyed, so a representative sample is selected.

If the purpose of the survey is to obtain data useful for designing recycling programs,

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ration programs see recovery rates as high as 35 percent in some communities, a figure that increases to 50 percent or more when yard debris collection is offered.

Rainbow Disposal opened its MWP facility in Huntington Beach, California in May 1994. It accepts 1,500 tons per day of residential and commercial waste from Huntington Beach and several surrounding communities. About two-thirds of that volume is handled on processing lines that include mechanical separation, such as a custom-designed shaker screen, and 240 sorters.

A recovery rate of over 25 percent is claimed by the company. Asphalt, concrete, glass, metal, paper, plastics and wood are recovered, although not all materials are handled by the MWP lines.

Waste Management has operated an MWP plant for the City of Omaha, in which plastic-bagged and loose recyclables are sorted from residential waste. That program may end as the city has put out a bid for waste management and recycling that includes source separation as an option. Though MWP has been successful from a functional point of view, according to city solid waste staff, it has been criticized by members of the public.

In any case, Waste Management will have plenty of opportunity to evaluate MWP with its contract to build and operate four plants for the City of Chicago. The plants are expected to be on line before the end of next year.

Strong markets

With outstanding demand for any type, of secondary fiber, as well as metal and some plastics, marketing recovered materials from MWP plants has been relatively easy (see "Hot markets, high prices" in the November 1994 issue).

"In the short term," says Mary Cesar senior consultant with Jaakko Pöyry (Tarrytown, New York), "It 'will be a sellers' market for fiber." This will boost the ability of MWP plants to get attractive prices and find secure homes for scrap paper she believes. In the long term, quality will count more, although there will always be a home for the lower grades of mixed paper.

A representative of Taormina Industries acknowledges that they "can't sell MWP materials for the highest quality" and that "there is no question contamination and recovery rates suffer." However, there has been no problem finding markets for recyclables from its MWP lines.

Dan Cotter, a broker with Pacific Forest Resources Inc. (Corte Madera, California) has handled recovered paper material out of several MWP plants and found no problem in obtaining homes for it. The primary issue is occasional high levels of moisture, that may go five to 10 percentage points above acceptable levels. High moisture levels are more of a problem with ONP and mixed paper, which tend to absorb moisture more easily from surrounding garbage; OCC is not as affected by this problem. The appearance of paper bales from MWP facilities is also not as good.

Packaging Corporation of America (Rittman, Ohio) buys all the paper recovered by an MWP plant operated by Norton Environmental for Medina County, Ohio. PCA has had no problem using the recovered paper in making boxboard products. Marty Rusk, with PCA, attributes the high material quality to good training and low worker turnover at the Medina plant.

Maintaining material quality at the Folsom plant is always a challenge, with an enforced worker turnover at least every nine months, as inmates leave the correctional facility. Glass containers, which receive only one sort, have been marketed, & color-sorted bottles, but the price is usually downgraded due to higher levels of contamination, such as the nonbottle glass and other waste. Material quality was also affected when the waste stream jumped by 50 percent in August. Sorters could not maintain quality with the increased throughput, and the ONP was downgraded from a No. 8 to a No. 6 grade. Additional sorters should enable the plant to regain its top quality price for ONP

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Commercial recycling incentives

- ✓ As disposal rates continue to increase, the economic incentive to recycle increases.
- ✓ Knowledgeable policymakers can start recycling collection programs with costs lower than waste collection and disposal.
- ✓ State and local recycling goals or mandates of 25 to 50 percent are increasingly common.
- ✓ Large recycling collection containers cost no more to empty than small containers.

the sample should be selected to obtain desired representation from various unique commercial sectors - such as food service establishments, offices, manufacturing establishments, etc. The sectors are typically defined to include groups whose waste composition is expected to differ significantly from other groups - implying that effective recycling programs would target different materials in different sectors. Ecodata has recently conducted generator surveys in San Jose, California; Montgomery County, Maryland; Babylon, New York; Portland, Oregon; and Philadelphia (2).

Commercial waste generation

In each of the surveys conducted, the customer's payment for waste collection services is typically of great interest to policymakers. In the commercial sector, dominated by profit-seeking enterprises, recycling occurs when the economics favor the program. When they know the prices for waste collection and disposal, policymakers can seek to devise recycling programs with prices below the level prevailing for waste collection and disposal.

In most markets, there is a wide variance in the fees charged individual customers for waste collection and disposal. Quantity-based pricing is the norm in the commercial sector, with fees varying according to the size of the container and the number of weekly collections.

Most customers are billed a monthly amount, and most bills do not itemize the services. Thus, to determine the service level, one must interview the facility manager, who will know the size of the container and the number of weekly pickups. The accounts payable department can provide information regarding fees for services.

In analyzing the prices charged for commercial waste collection, the monthly fee is converted to a unit price - the fee per pickup of a cubic yard of container space. This is com-

Table 1 Formula for converting unit prices to monthly billed amounts

Bin size	Collection (1) (\$/cy/pickup)	Disposal (\$/cy/pickup)	Total fee (\$/cy/pickup)	Monthly fee/customer (1 pickup/week)
One cubic yard	\$ C	\$ D	\$ (C+D)	\$ 4.3x(C+D)
Two cubic yards	\$ 0.60xC	\$ D	\$ (0.60xC+D)	\$ 4.3x(0.60xC+D)x2cy
Four cubic yards	\$ 0.46xC	\$ D	\$ (0.46xC+D)	\$ 4.3x(0.46xC+D)x4cy
Eight cubic yards	\$ 0.27xC	\$ D	\$ (0.27xC+D)	\$ 4.3x(0.27xC+D)x8cy

C = Collection cost.

D = Disposal cost.

cy = Cubic yard.

(1) This is the average of the results in three different communities. The range of values is quite narrow. The ratio of two-cubic-yard to one-cubic-yard fee is 60 to 70 percent. The ratio of the four-yard-unit fee to the one-cubic-yard fee is 46 to 50 percent. The ratio of the eight-cubic-yard fee to the one-cubic-yard fee is 24 to 30 percent.

Source: Ecodata, 1994.

puted by dividing the monthly fee by the quantity: (4.3 weeks/month) x (cubic yard size of container) x (number of times per week the container is emptied). For a two-cubic-yard container emptied three times a week, the monthly fee would be divided by 25.8.

The pricing structures in most markets reflect the fact that it takes as much time to service a smaller container as it does a larger container. Thus, the collection fee per cubic yard of container space decreases with increases in the size of the container. The disposal portion of the fee (the disposal fee per cubic yard of container space) remains constant as container size increases. These two forces, the decreasing collection fee and the constant disposal fee, are combined in the price structure facing the commercial customer.

Table 1 shows the relationship between container size, unit fee for collection, unit fee for disposal and monthly fees paid. The collection component of the fee decreases significantly as the container size increases. The collection fee per cubic yard of container space for an eight-cubic-yard container is just 27 percent of the collection fee per cubic yard of container space for a one-cubic-yard container. Of course, the monthly fee for collection of an eight-cubic-yard container greatly exceeds the monthly fee for collection of a one-cubic-yard container.

Table 2 indicates typical unit and monthly fees for commercial refuse collection, in markets with low, medium and high collection fees and for markets with low, medium and high disposal fees. There is no correlation between the level of the collection fee and the prevailing disposal fee.

Commercial recycling

Collection fees are determined by prevailing wages, customer distribution, the location of the disposal site and market structure. Of these factors, market structure and prevailing wages are probably the two most significant determinants of prevailing price levels.

Disposal fees are often determined by local governments, which may have construct-

ed or contracted for waste disposal facilities or services. Where more than one disposal facility serves a community, disposal fees are determined by market forces.

A low collection fee is \$6.00 per collection of a one-cubic-yard container. This unit fee decreases as container size increases, to \$1.62 per cubic yard per collection of an eight-cubic-yard container. The average fee per cubic yard in this, or any, market depends on the distribution of customers by container size. In computing an average, therefore, it is important to weight each observation according to its frequency in the overall distribution of customers. Failure to weight observations would result in a severe overestimation of prevailing fees for solid waste collection. Such an overestimate could lead to designing recycling programs that would not be economically successful.

Collecting recyclables from commercial customers would tend to mirror the fees charged for refuse collection, assuming that collection is provided by the same firms collecting the refuse. If, however, recycling firms collect recyclables and waste haulers collect waste, then the two sets of firms may operate in different competitive environments, and the collection fees inherent in the prices quoted by the two sets of firms may differ significantly.

In the markets surveyed here, generators tended to receive money from their collector of recyclables; this fee is presumably net of the cost of collecting and processing the commodities.

Large garbage customers surveyed were more likely to be recycling than were smaller customers. For example, in Babylon, New York, garbage customers using large roll-off containers were twice as likely to recycle as were customers using bins of one- to eight-cubic-yard capacity. In San Jose, California, customers on outlying routes, with more space to accommodate additional containers, are almost 20 percent more likely to recycle than are customers in the more congested central areas of the city. In four communities, the

percentage of commercial generators identifying themselves as conducting recycling activities ranged from 23 percent in Babylon to 75 percent in Portland.

When large garbage customers, who pay the lowest fees for refuse collection, are the most likely to recycle, programs aimed at these large firms must use the lowest collection costs as the target for the recycling fees. In well over 50 percent of the cases, the large garbage customers that recycle report a reduction in overall waste management fees.

All garbage customers report they would be extremely willing to recycle if their overall solid waste fee decreased; if the overall solid waste fee were to increase to finance recycling, almost all customers would be unwilling to recycle. For the large customers, reducing the bin size or frequency of collection as recycling is implemented generates an immediate reduction in refuse collection fees. If commercial generators are to accept the program willingly, the cost of the recycling program, then, cannot exceed this reduction in the refuse fee.

Small customers that begin to recycle may be unable to reduce the size of their collection bin. Such customers, therefore, may be least willing to recycle, even if there is a lower fee for recycling than for refuse, because their total monthly bill would increase if the size of the refuse bin, and the cost of their garbage collection service, cannot be decreased.

Such garbage customers often recycle by taking the materials home to include in the residential curbside program. This is a cost-effective way to increase the quantity of materials at each residential stop, which reduces the unit costs of curbside recycling. This typically unpublicized activity is widespread;

Table 2 Typical commercial unit and monthly prices

Bin size	Collection (1) (\$/cy/pickup)	Disposal (2) (\$/cy/pickup)	Total fee (3) (\$/cy/pickup)	Monthly fee/customer (1 pickup/week) (3)
Typical values:				
Low	\$ 6.00	\$ 2.00		
Medium	\$10.00	\$ 3.50		
High	\$20.00	\$ 5.00		
Commercial fees:				
Low collection cost/				
low disposal fees	\$ 6.00	\$ 2.00		
One-cubic-yard bin	\$ 6.00	\$ 2.00	\$ 8.00	\$ 34.40
Two-cubic-yard bin	\$ 3.84	\$ 2.00	\$ 5.84	\$ 50.22
Four-cubic-yard bin	\$ 2.82	\$ 2.00	\$ 4.82	\$ 82.90
Eight-cubic-yard bin	\$ 1.62	\$ 2.00	\$ 3.62	\$124.53
Medium collection cost/				
low disposal fees	\$10.00	\$ 2.00		
One-cubic-yard bin	\$10.00	\$ 2.00	\$12.00	\$ 51.60
Two-cubic-yard bin	\$ 6.40	\$ 2.00	\$ 8.40	\$ 72.24
Four-cubic-yard bin	\$ 4.70	\$ 2.00	\$ 6.70	\$115.24
Eight-cubic-yard bin	\$ 2.70	\$ 2.00	\$ 4.70	\$161.68
High collection cost/				
medium disposal fees	\$20.00	\$ 3.50		
One-cubic-yard bin	\$20.00	\$ 3.50	\$23.50	\$101.05
Two-cubic-yard bin	\$12.80	\$ 3.50	\$16.30	\$140.18
Four-cubic-yard bin	\$ 9.40	\$ 3.50	\$12.90	\$221.88
Eight-cubic-yard bin	\$ 5.40	\$ 3.50	\$ 8.90	\$306.16

(1) Based on results of surveys Ecodata has conducted. The typical values for low, medium and high collection fees are for once-a-week collection of a one-cubic-yard container, exclusive of disposal, as obtained from surveys. Fees for other container sizes are computed using the formula presented in Table 1.

(2) The disposal fee per cubic yard of container space is computed using an in-container density of 125 pounds per cubic yard.

(3) The total fee and monthly fee columns are computed using the formulae contained in Table 1.

Source: Ecodata, 1994.

generators in all communities report this type of recycling. Perhaps publicizing this as an alternative is a cost-effective way to bring recycling to a greater percentage of small commercial establishments.

Conclusion

Just as individual communities may have very different prevailing prices for commercial refuse collection, so too may individual communities have different waste generation patterns. The waste composition of materials discarded from different types of commercial establishments appears to be quite comparable between communities. Sectors dominated by national or regional chains, such as food sales, tend to be leaders in recycling. In fact, they are among the sectors most likely to recycle in all the markets studied. Manufacturing establishments are also among the most likely to recycle, perhaps because of their focus on materials handling.

The observed pattern of existing recycling, however, differs significantly from one community to another. In Portland, 73 percent of establishments in the retail/wholesale trade group report that they recycle, while the comparable figure for Montgomery County is 33 percent. Yet institutions/hotels in the two communities are about equally likely to re-

cycle (4.6 percent in Montgomery County and 44 percent in Portland).

Despite these caveats regarding the differences among communities, several generalizations can be made. Disposal rates in communities studied ranged from approximately \$30 per ton in San Jose to approximately \$80 per ton in Portland. As disposal rates increase, the economic incentive to recycle similarly increases. Market-driven recycling in the nonresidential sector is directly related to prevailing disposal prices.

A second observation can be made regarding the nature of recycling by particular generators. Most generators report that they recover a small number of commodities for recycling, although the type of commodity varies by type of generator. Retail and wholesale trade establishments are most likely to recover old corrugated containers; offices are most likely to recover high-grade paper; manufacturing establishments are most likely to recycle metals and wood, in the form of pallets.

In Portland, for example, 85 to 90 percent of all the recycling in every sector examined is accounted for by only three commodities. Of course, these commodities are not the same for all sectors, but the observation has important implications for designing efficient and effective recycling programs - most of the diversion can be accomplished through

appropriate targeting of a few commodities for each sector, based on the waste composition of that sector.

In sum, commercial recycling is highly dependent on local conditions and programs. The extent of recycling varies not only from one community to another, but also from one sector to another. Across all communities, commercial generators appear to be driven by economic incentives; they are anxious and happy to recycle if they can do so without increasing costs.

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Footnotes

- (1) Haulers are typically reluctant to reply to such questions unless they can be guaranteed that their data will be aggregated with that from other firms, to maintain the confidentiality of individual responses. Also, haulers will not speak to an interviewer unless the interviewer is extremely knowledgeable about collection equipment, terminology and conventions. Haulers were surveyed in San Diego; Montgomery County, Maryland; and Philadelphia. The surveys, which were conducted by solid waste professionals, had completion rates of over 90 percent of the firms surveyed.
- (2) In Portland, Oregon, Ecodata designed the survey with Waste Matters Consulting and Portland State University, which supplied the data collection personnel.