Recycling jumps when communities use unit pricing for residential garbage

by Marie Lynn Miranda and Joseph E. Aldy

A Duke University research project finds that unit pricing may help waste diversion behavior evolve into waste prevention behavior.

Today, more than 1,400 communities employ some variation of unit pricing for residential solid waste. Research recently conducted includes an analysis of nine unit pricing communities.

Fee structure

The unit pricing fee per gallon of waste collected ranges from $0.02 in Glendale, California to $0.10 in San Jose, California. The landfill or incinerator tipping fees charged to the communities range from $21.35 to $59.51 per ton (see Table 1).

As Figure 1 shows, a higher tipping fee for a community does not indicate that the community charges a higher unit pricing fee. This may imply that, for these communities, diversion and source reduction goals and hauling and labor costs are more significant in setting unit prices than are tipping fees.

Promotion and education

To encourage participation in their waste management systems, the nine case study communities have developed a variety of educational programs. With one exception (Glendale), all the studied communities implemented special public education programs in conjunction with the startup of their unit pricing programs. The communities purchased advertisements in the local media, provided public service announcements, mailed informational brochures to all residents and presented the new unit pricing program at public meetings.

In addition to the start-up promotional efforts, these municipalities continue to operate educational outreach programs. Solid waste officials indicate that educational efforts serve to promote their goals of increased program compliance, increased recycling and yard trimmings collection participation, increased source reduction and decreased undesirable diversion.

Most of the communities had some type of ongoing information programs for their residents. Half used mass media (radio, television, newspapers) to reach their residents.

Table 1 Unit pricing fees and disposal tipping fees in nine communities

Community	Fee per gallon per week	Tipping fee per ton
Downers Grove, IL	$0.05	$32.00
Glendale, CA	0.02	21.35
Grand Rapids, MI	0.03	59.51
Hoffman Estates, IL	0.05	32.00
Lansing, MI	0.05	36.00
Pasadena, CA	0.03 to 0.04	24.11
San Jose, CA	0.09 to 0.10	26.11
Santa Monica, CA	0.05 to 0.09	48.00
Woodstock, IL	0.05	35.00

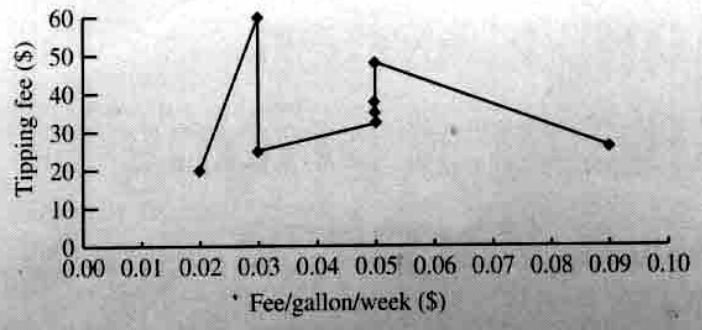
Source: Marie Lynn Miranda and Joseph E. Aldy, *Unit Pricing of Residential Municipal Solid Waste: Lessons from Nine Case Study Communities*, March 1996.

Landfilling and incineration

In seven of the nine communities (Downers Grove, Illinois; Glendale; Grand Rapids, Michigan; Hoffman Estates, Illinois; Lansing, Michigan; San Jose; and Woodstock, Illinois), landfilled and incinerated waste decreased by at least 20 percent. For example, Grand Rapids' waste incinerated decreased 14 percent between 1990 and 1994; however, its per household waste incinerated decreased 22 percent, even as the number of service subscribers increased, from 35,000 in 1987 to 40,000 in 1994. Lansing and Hoff-

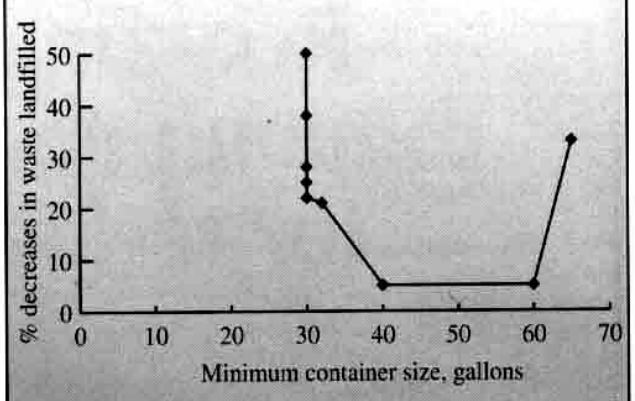
Marie Lynn Miranda is assistant professor of the practice and Joseph E. Aldy is associate in research, both with the Nicholas School of the Environment at Duke University in Durham, North Carolina.

Figure 1 Comparison of unit pricing fees and disposal tipping fees



Source: Marie Lynn Miranda and Joseph E. Aldy, *Unit Pricing of Residential Municipal Solid Waste: Lessons from Nine Case Study Communities*, March 1996.

Figure 2 Comparison of minimum container volume and reduced landfilled waste



Source: Marie Lynn Miranda and Joseph E. Aldy, *Unit Pricing of Residential Municipal Solid Waste: Lessons from Nine Case Study Communities*, March 1996.

man Estates achieved landfilled waste reductions of 50.0 percent and 37.6 percent, respectively.

In Santa Monica, California, landfilled waste decreased less than 6 percent, and Pasadena, California experienced increases in waste landfilled after the implementation of unit pricing. Because the Southern California communities provide large minimum cart volumes, residents may not experience any real incentive to reduce and divert waste. Smaller minimum containers do help decrease landfilled waste more effectively. Figure 2 demonstrates that, with the exception of Glendale, the smaller the minimum container volume for a community's unit pricing program, the greater the decrease in landfilled and incinerated waste.

Higher unit fees affect the reductions in landfilled waste, contingent on the minimum container size (see Figure 3). For example, although Santa Monica employs a relatively high unit pricing fee ($0.05 to $0.09 per gallon per week), the large minimum size container negates the effects of the economic incentives of the fee. Grand Rapids, however, charges a relatively low unit pricing fee ($0.03 per gallon per week), but uses a small minimum container, and achieved a landfilled waste reduction of 22 percent over a five-year period.

Recycling

All nine communities operate curbside recycling programs. One community mandates household participation, six provide recycling containers but do not mandate participation and the other two provide recycling containers and service on request. Most of the case study communities recover their costs for recycling collection through the unit pricing fee for solid waste collection and through the sale of recyclable materials to regional vendors. The communities reported strong recycling markets, which provide these communities with the revenues to maintain and, in some cases, to expand their recycling programs.

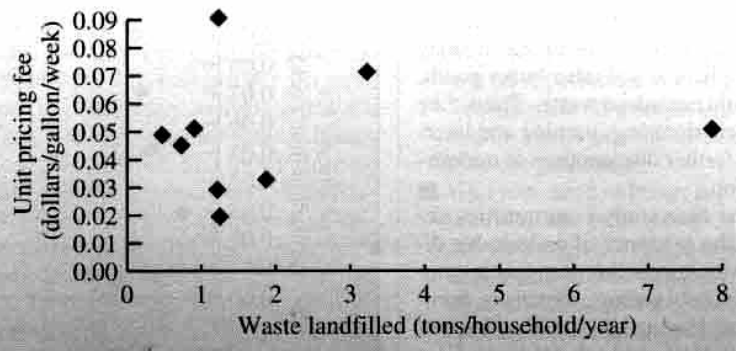
Eight communities experienced significant increases in recycling tonnages since 1990, confirming that recycling participation and tonnages increase after unit pricing is implemented. In San Jose and Lansing, recycling levels more than doubled over a two-year period and a three-year period, respectively. The Illinois communities studied saw recycling rate increases between 41 and 64 percent over the past five years; Downers Grove, Hoffman Estates and Woodstock experienced the highest levels of recycling tonnages per household of the eight communities operating recycling programs in 1993 (see Figure 4). (Grand Rapids does not have recycling data due to the recent implementation of its recycling program.)

Recycling rates increased approximately 70 percent and 30 percent, respectively, in Pasadena and Santa Monica over a three-year

Study highlights

- ✔ Diversion increased in eight of the nine communities studied.
- ✔ Eight communities experienced significant increases in recycling levels since 1990.
- ✔ Promotion and education efforts increased participation in recycling and yard trimmings collection programs.

Figure 3 Comparison of unit pricing fee and waste landfilled/incinerated, 1993



Source: Marie Lynn Miranda and Joseph E. Aldy, *Unit Pricing of Residential Municipal Solid Waste: Lessons from Nine Case Study Communities*, March 1996.

period. Although Glendale's recycling rate increased 60 percent the year it implemented unit pricing, the city's recycling rate has fluctuated since then and was lower in 1994 than in 1992. Providing large minimum containers, as is common in Southern California, does, however, act as a disincentive to recycle.

Yard trimmings collection and backyard composting

Eight of the nine communities provide yard trimmings collection services (Santa Monica is the exception). Four communities offer residents the opportunity to purchase backyard compost bins from the municipal government. Another four provide technical information to residents about backyard composting. (Grand Rapids provides neither composting bins nor information.)

The study found that communities that do not charge for yard trimmings collection actually collect greater amounts of yard trimmings per household. Although year-round collection in the California communities may explain some of the additional per household setouts, Lansing achieves greater per household collections than Downers Grove, Hoffman Estates and Pasadena, the three case study communities that charge fees to collect yard trimmings.

Undesirable diversion

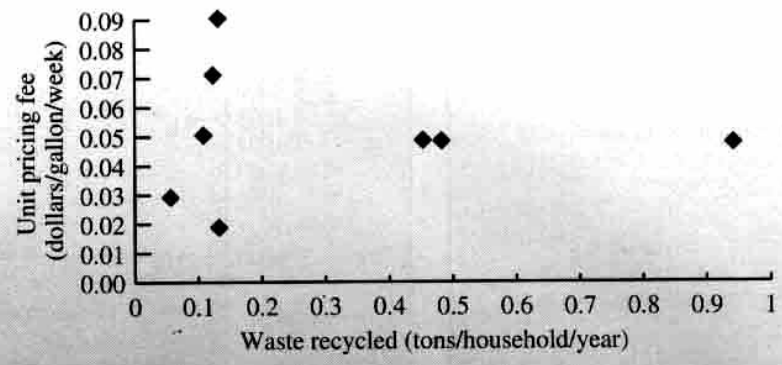
Some diversion from landfilling and incineration occurs in the form of illegal dumping, burning and littering. To minimize this undesirable diversion, communities often take a three-pronged approach to the problem.

First, they provide educational programs and materials that discourage illegal dumping and burning. Second, these communities offer special collection programs so households can legally dispose of items, such as holiday greenery, appliances and other bulky goods, and household hazardous waste. Third, they enforce illegal dumping, burning and littering laws as further disincentives to undesirable diversion.

All of the case study communities acknowledge the existence of undesirable diversion activities, including dumping in commercial and school garbage containers, burning refuse and leaving household garbage or junk at charitable organizations' drop-off locations. The significant variance in per ton clean-up costs for illegally dumped waste indicates that dollars spent on cleanup do not serve as a meaningful measure for the severity of the undesirable diversion problem.

As households become more accustomed to their communities' unit pricing programs, undesirable diversion rates appear to decrease. For example, the Downers Grove Police Department reported only 23 illegal dumping and littering violations between May 1993 and May 1994, a decrease of 78 percent from the period of May 1990 to May 1991. In the first six months of its unit pricing program, Hoffman Estates issued 103 citations; for the period between January 1993 and November 1994, the city issued only 71 citations, as program compliance increased.

Figure 4 Comparison of unit pricing fee and waste recycled, 1993



Source: Marie Lynn Miranda and Joseph E. Aldy, *Unit Pricing of Residential Municipal Solid Waste: Lessons from Nine Case Study Communities*, March 1996.

Waste prevention

Although in eight of nine communities the amount of waste landfilled did decline, four of the nine communities experienced an increase in total waste generated. In several other communities, total waste generated decreased; other communities require inferences from the data to assess the degree of waste prevention. For instance, in Lansing, only one-half of residents receiving the city recyclables and yard trimmings collection service dispose of their waste through the city unit pricing program. One may reasonably infer, however, that some waste prevention occurs in Lansing, although the magnitude of the reduction cannot be determined.

Between the 1993 fiscal year and 1994 fiscal year, San Jose households significantly increased their waste diversion activities. San Jose's landfilled waste decreased by more than 20 percent, while residential recycling more than doubled and yard waste setouts increased more than 40 percent. The total waste generated (landfilled waste, collected recyclable materials and yard trimmings) for San Jose actually increased during this period.

It appears that the immediate response to unit pricing implementation by San Jose households was to divert their waste, and not to prevent waste. Once gains were made in

diversion, households may then have begun to look at preventing waste. Projections for Fiscal Year 1995 indicate that recycling and yard trimmings set-out levels will remain virtually unchanged from FY 1994, while landfilled trimmings will decrease another 20 percent, indicating a predicted 10 percent decrease in total waste generated. At least in San Jose, residential waste disposal activity appears to be following a transitional path that begins with waste diversion behavior and evolves into waste prevention behavior after several years of the unit pricing program.

A similar pattern characterizes the waste disposal trend in Downers Grove. In the first two years of the unit pricing program, the amount of waste landfilled decreased as households diverted their waste through recycling and yard trimmings collection. The total generated waste remained unchanged until FY 1993, the third year of the unit pricing program, when the amount of waste landfilled decreased by another 3,300 tons from the previous year, while recycling and yard trimmings collection increased by less than half of that amount. Total generated waste decreased by approximately 10 percent between FY 1992 and FY 1993.

The unit pricing programs in Glendale, Hoffman Estates, Pasadena and Santa Monica, however, do not appear to encourage waste prevention. Although Hoffman Estates experienced significant decreases in its landfilled waste, waste diversion behavior has been more evident than waste prevention behavior. Total generated waste levels in Glendale have fluctuated only slightly since the city implemented its unit pricing program. Pasadena has experienced an increase in waste landfilled, waste recycled and yard trimmings collected since introducing its unit pricing program, perhaps resulting from the disincentive created by a large minimum cart volume in these cities' subscription programs. In Glendale, free yard trimmings collection may do a better job of diverting waste from disposal than the unit pricing program does of preventing the generation of waste. Total waste generation in Santa Monica decreased by about 1 percent in the first year after the city implemented unit pricing.

Conclusion

Solid waste managers must craft unit pricing programs very carefully and very deliberately. Our research leads us to the following recommendations:

- Strong complementary programs like recycling and yard trimmings collections decrease the amount of landfilled waste and mitigate against undesirable diversion. However, it is likely that these programs also decrease the incentives to prevent the generation of waste.
- Public education campaigns should include information about the unit pricing program, complementary programs and enforcement procedures. In addition, such campaigns need to include detailed information on opportunities for managing waste through preventing its generation, if communities hope to decrease the total amount of waste generated.
- Unit fees need to be set high enough to provide a true price incentive without being set so high as to drive residents to undesirable diversion. Similarly, a large minimum container size will likely negate the price incentive that drives unit pricing programs.
- Strict enforcement and substantial fines raise the costs to residents of illegal dumping, littering and burning, and over time provide the incentive to dispose of waste legally.
- It takes several years before the full impact of unit pricing programs take effect. Recycling increases will likely occur first, followed by increases in yard trimmings diversion, declines in undesirable diversion and, finally, by increases in waste prevention. **RR**

A complete copy of the study can be found on the U.S. Environmental Protection Agency Web site (http://www.epa.gov/epaoswer/unitpric.htm).