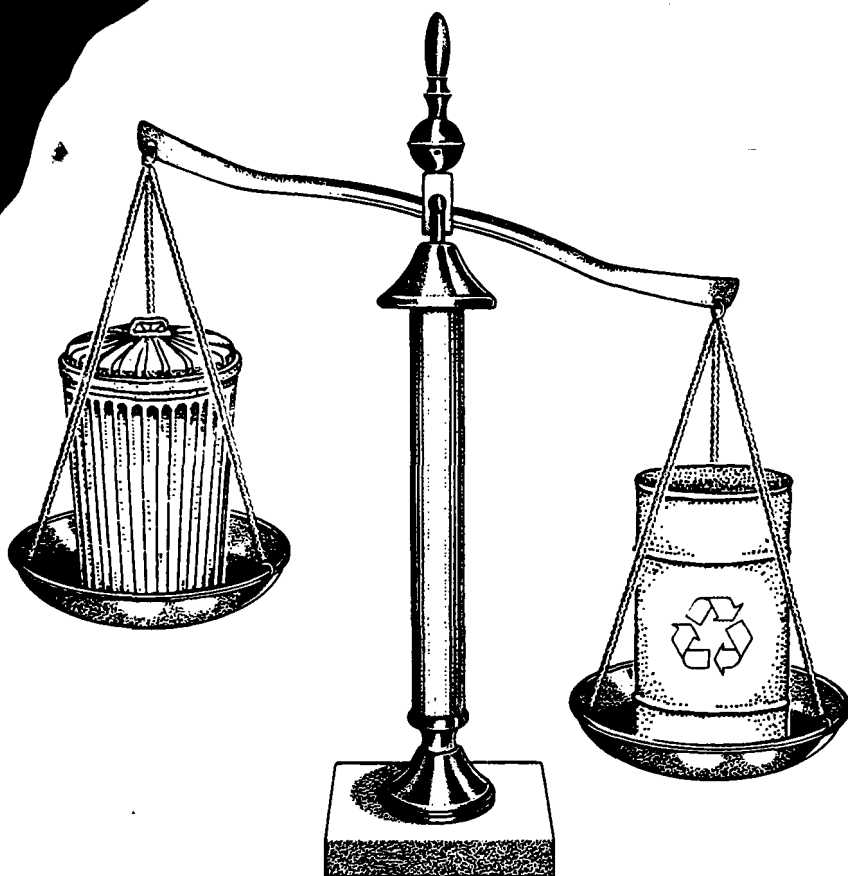


VARIABLE RATES IN SOLID WASTE

Handbook for Solid Waste Officials



VOLUME I - EXECUTIVE SUMMARY

by Lisa A. Skumatz, Ph.D. and Cabell Breckinridge

Funded jointly by the U. S. Environmental Protection Agency,
Region 10, Solid Waste Program, and the
City of Seattle Solid Waste Utility



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VARIABLE RATES IN SOLID WASTE: HANDBOOK FOR SOLID WASTE OFFICIALS¹

VOLUME I. EXECUTIVE SUMMARY

THE WASTE DISPOSAL CRISIS

Landfill space is becoming a major nationwide crisis. Almost 40% of respondents to a recent survey conducted by the American Public Works Association indicated that their landfill space would run out within 5 years.² In addition, this survey indicated that 74% were currently doing nothing to reduce solid waste volume. There is a nationwide disposal crisis, and it is affecting jurisdictions that are large and small, urban and rural, all across the nation.

Locally, the crisis can manifest itself in rapidly increasing disposal tipping fees, in the need to haul waste hundreds of miles for disposal, in mandatory recycling programs, in struggles to comply with changing landfill standards, in public opposition to the siting of needed new disposal facilities, or in barges filled with waste with no place to dock.

What can jurisdictions do to solve this crisis? Traditional options include:

- o building a new landfill,
- o building an incinerator in hopes of extending the life of existing landfills, or
- o more recently, jurisdictions have begun imposing mandatory recycling programs.

Many jurisdictions are facing very significant economic investments in either closing landfills, building new ones, or building incinerators. And the out-of-pocket costs of these huge investments don't include the significant problems of siting, changing regulations, public pressure, and long lead times.

¹ This work was funded by a grant from the Environmental Protection Agency, Region 10, Solid Waste Program, and by the City of Seattle Solid Waste Utility.

² Solid Waste Collection & Disposal: 1987, by American Public Works Association (APWA), 1987.

IS THERE ANOTHER SOLUTION?

The problem would be reduced if residents could be provided incentives to decrease waste, increase recycling, and do a number of other "good things". However, there are many citizens who simply will not react to the crisis unless there is an economic, or "pocketbook", reason to do so.

In most parts of the country, garbage is removed once or twice a week with the revenues coming from one of two places:

- o from a portion of the property tax, or
- o from fixed bills for unlimited pickup (bills that do not vary with respect to the amount of garbage taken away.)

Neither of these methods gives residents any incentive to reduce their waste. In fact, with the property tax method, residents never even see a bill, and generally have no idea how much it costs to remove their garbage every week. Areas with these methods of payment have often had to resort to mandatory recycling programs in order to try to reduce their amount of garbage.

Residents in several jurisdictions around the country have come to recognize that you can achieve remarkable successes in recycling and waste reduction without any mandatory features through one simple measure: volume-based garbage rates.

WHAT ARE VOLUME-BASED RATES?

In volume-based rates, the level of payment varies with a measure of the volume of waste disposed. Customers who use more service pay a higher rate, and those who use less pay less.

There are two major types of volume-based rate designs in use which provide this principle -- customers putting out more waste pay higher fees:

- o a subscribed variable can system, or
- o a pre-paid bag, tag, or sticker system.

Briefly, a variable can system involves having customers select subscription levels based on the normal number of cans of garbage they need to dispose of each week. Their bills are calculated based on the subscribed service level, with higher subscriptions leading to higher bills. The jurisdiction usually offers subscription levels in standard 30-gallon increments (one can, two cans, etc.). Seattle and

Olympia, Washington also offer smaller service levels that hold 19 and 10 gallons respectively as a reward for small waste generators. Higher service levels are charged higher rates.

Jurisdictions that employ a bag system charge a fee for each "official" bag that includes the cost of disposal.³ This special fee then entitles that waste to be collected. Under a bag or tag system, customers purchase special garbage bags (or tags) from the jurisdiction or from outlets at a price that includes the cost of disposal. The more bags of waste they put out, the more they must pay. This type of system is in place in several communities in Pennsylvania, New Jersey, Michigan, New York and several other states.

The key under both these systems is that the amount that customers pay increases significantly as they use higher levels of service. Customers are not limited in what they may dispose, but they are required to pay for what they use.

VOLUME-BASED RATES ARE AN EFFECTIVE RECYCLING INCENTIVE

Volume-based rates have proven to be an extremely effective recycling incentive. Since Seattle's introduction of variable can rates in 1981, Seattle's customers, eager to reduce their bi-monthly garbage bills, have reduced the average number of cans subscribed from 3.5 down to just over 1 can. And the recycling percentage in terms of actual tons of waste diverted (not just participation rates) was over 24% before the introduction of any City-sponsored recycling programs.

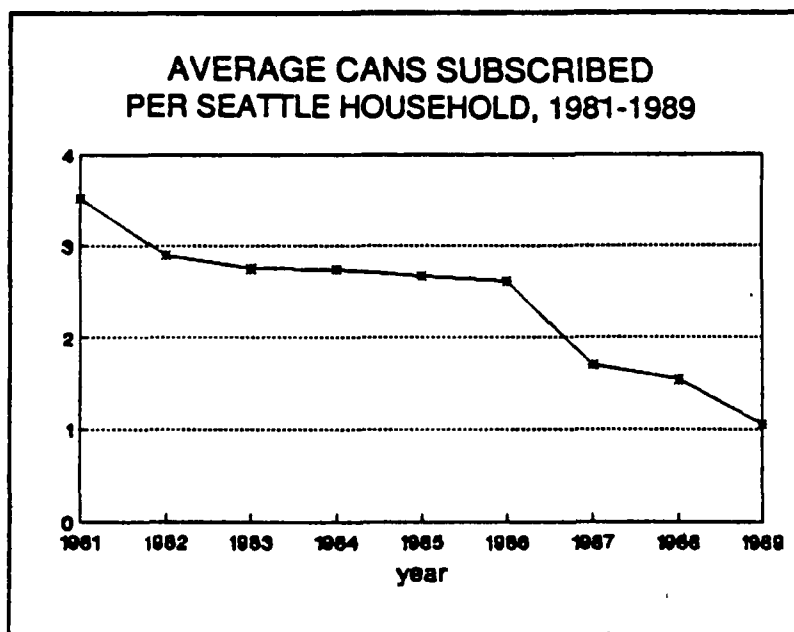


Figure 1

³ The charge usually includes at least the cost of disposal. Some jurisdictions also include a share of the system's fixed costs.

Volume-based rates have also contributed to the quick success of Seattle's city-operated recycling programs, which provide customers a convenient opportunity to reduce subscription levels by recycling materials they might otherwise have thrown away. The City has achieved an amazing 75% sign-up rate in its curb/alley recycling program. More important than sign-up statistics, however, is the amount of waste diverted by the program. The program currently collects about 3,500 tons per month, or an average of 63 pounds per participating household. Over 60% of Seattle's customers subscribe to the City's new yard waste collection and composting program. In 1989, the curbside yard waste program diverted over 31,000 tons of residential waste to a composting facility.

In addition, based on an analysis of numerous factors, the Utility has determined that the introduction of variable can rates has helped slow the growth of disposed tonnage.

There have been two factors assisting this result. First, Seattle's rates increased to the level where customers took notice. In addition, the rate structure provides clear rewards for reducing waste. The steep rate structure adopted at the beginning of 1989 has been particularly effective in achieving this goal. Customers can achieve real savings on their garbage bills by participating in this program, and Seattle's customers understand and take advantage of this.

Incentive-based rate design goes hand-in-hand with recycling and waste-reduction programs, and is a critical part of integrated solid waste management. In Seattle, the combination of rate incentives and additional recycling and diversion programs has allowed Seattle to decrease the amount of waste it brings to the landfill by 24% compared with 1988 levels (see Figure 2). Similar and dramatic reductions in landfilled tonnage have also been noted at jurisdictions that have instituted bag systems. Perkasio, Pennsylvania for instance, noted a 35-45% decline in tonnage brought to its transfer stations in the first year after the introduction of their bag system and recycling program.

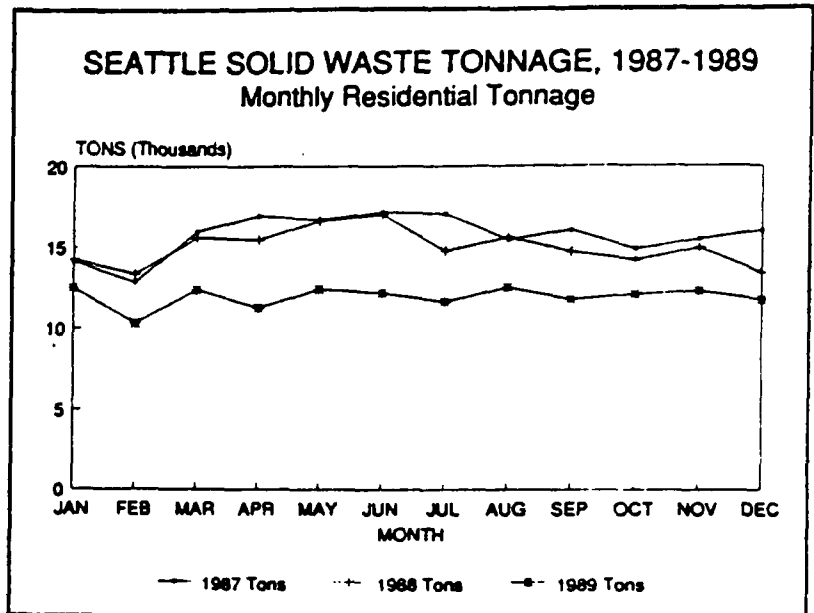


Figure 2

WHAT OTHER BENEFITS DO VOLUME-BASED RATES OFFER?

Volume based rates can benefit a community in a number of ways:

- o Customers receive an incentive to reduce disposal.
- o The rates are fair – small users don't subsidize larger users.
- o Incentives support recycling programs.
- o Mandatory recycling can be delayed or avoided altogether.
- o Fees make customers aware of the environmental consequences of their actions.

Variable rates give customers a very clear reward for reducing the amount of waste that they dispose of: they pay a distinctly lower bill. An additional benefit of the system is that it does not favor any particular method of reducing waste – all methods and programs are rewarded on an equal footing. Other benefits of volume-based rates include:

- o Volume based rates are fair – customers who dispose of similar amounts of waste pay similar amounts of money. Those who dispose of less, pay less. Customers get control over the bill they pay. In addition, the rates reward all methods of reducing waste including waste reduction and recycling.
- o Implementation of any city-sponsored recycling programs will be much more successful with these rate incentives in place. The combination of variable rates and convenient recycling programs makes for a much more integrated garbage system, and gives customers good alternatives and choices.
- o Customers get a chance to show what they can do through voluntary rate-induced waste reduction. Your programs need not be mandatory and therefore your enforcement burden can be reduced, and you may still invoke mandatory programs later if you don't achieve the goals you need.
- o This method gives customers a better idea of the actual cost of disposing of waste and provides a better relationship between customer behavior and rates. Masking the cost of garbage service all these years has made the cost associated with new landfills and incinerators particularly hard to justify to customers in some areas. It is difficult to condemn customers for making

unwanted choices in their waste disposal behavior if they are not given the information (generally costs of disposal reflected in price signals) to make intelligent choices. Customer education is key to getting customers to work with the system.

- o Pricing garbage services in this manner puts solid waste on an equal footing with the way water and electricity services are priced. Customers pay based on the amount of service they use, and have economic reasons to conserve. Customers have accepted the principle for these utilities and have modified behavior in response to the price incentives.
- o Using volume-based rates to reduce waste is quicker to implement than building new capital facilities to handle additional waste. The rates provide an environmentally sound alternative and can be implemented in a variety of situations. In addition, they integrate well with programs and can help lead to lower long-run system costs.

WHAT DO WE GAIN?

From a city management perspective, volume based garbage rates can gain the City:

- o Time to site new disposal facilities.
- o More options in terms of recycling vs. disposal investment
- o Support of low volume dumpers and recycling groups

Variable rates and the additional awareness of the solid waste issue that they bring have allowed a number of communities to propose aggressive waste reduction goals. For example, Seattle has proposed a set of non-mandatory programs that will bring it to an aggressive 60% recycling goal by the year 1996. Rate design is an integral part of this program. Seattle considers its volume-based rates its most effective recycling program. It can be yours too!

In addition, implementing volume-based rates is quicker than building new capital facilities. Even if capital facilities will be needed, volume-based rates may help buy extra time, and accustom customers to the idea of paying on the basis of service provided. Implementing variable rates (and recycling programs) can help win

support for additional disposal facilities because customers may recognize that the jurisdiction has made a good faith effort to avoid siting additional disposal capacity and is taking an integrated planning approach to the issue.

Variable rates can be implemented to reward voluntary reduction of waste by customers. The jurisdiction can still hold out mandatory measures as a threat if customers do not achieve the needed goals voluntarily. However, allowing customer choice and emphasizing voluntary programs often produce less ill-will than proceeding without giving customers a chance to "show what they can do".

Volume-based rates can produce a closer relationship between the costs and revenues for a solid waste jurisdiction. Rather than a rate system that generates revenues that do not vary with the amount of waste disposed, charging volume-based rates will tend to generate higher revenues from customers that cost more to serve.

Most importantly, volume-based rates are fair, provide excellent recycling incentives, are environmentally sound, and can help slow or even reverse growth in tonnage disposed.

WHO CAN IT WORK FOR?

Because the economic concepts underlying volume-based rates are universal, a volume-based rate structure can help a wide variety of jurisdictions, including those:

- o with collection performed by contract, franchise, municipal, or private arrangements,
- o that cover large, medium, or small numbers of customers, and
- o in any part of the country.

Whether variable can rates make sense depends on an assessment of specific circumstances, including those related to cost, timing, and political factors.

WHAT AFFECTS WHETHER IT WILL WORK IN OUR AREA?

Although costs are obviously a key factor, there are a number of other situations that help make adoption of a volume-based rate system simpler and more politically appealing:

- o Hauling contracts, franchises, rates, or billing systems are up for a change.
- o The jurisdiction faces any of a wide array of landfill or disposal problems,

including a shortage of landfill space, high tipping fees, changing landfill regulations, or public opposition or other difficulty siting new landfill or disposal options.

- o Jurisdictions in which the community wants to create recycling incentives to increase participation in an established or planned recycling program or satisfy local recycling advocates.
- o The existing system is perceived as unfair and encourages abuse.
- o The jurisdiction is running out of tax authority and can use the establishment of separate rates to free up tax revenues.
- o Medium to larger jurisdictions may have some advantages in being able to spread implementation and fixed costs over more customers. However, smaller jurisdictions may be able to be implemented more easily.

It may also be helpful if the solid waste jurisdiction is legally established as an entity that must cover its costs via fees, e.g. a utility or enterprise fund.

Although the factors mentioned above can make adoption of variable rates simpler, none are essential. A variable or volume-based rate system may be appropriate anywhere.⁴

WILL IT PAY/CAN WE AFFORD IT?

The question is whether you can afford not to do it!

Continuing to landfill is becoming more and more expensive, especially if the true costs of landfilling are considered (that means including costs of closing, difficulties of replacement of the landfill, etc.). Extending the life of existing landfills pushes the closure (and siting) costs out to later years, and means real dollar savings now that can be invested in recycling programs, etc. with actual benefits to the solid waste jurisdiction and its customers.

The final judgment of whether the new system will pay depends on a comparison of the costs vs. the savings of the new system.

⁴ Jurisdictions that may not benefit financially from the introduction of variable rates are those with long-term access to environmentally-sound landfill space and who are far from recycling markets. There may still be non-financial reasons for implementing such a system.

The types of costs that will be incurred with the implementation of volume based rates may include:

- o Contractual changes
- o Public information, outreach, and PR
- o Billing system changes
- o Cost of designing the rate system
- o Staffing increases, especially in customer service and field inspection crews.

The operation of a solid waste system funded with volume based rates is almost certain to be more expensive than a flat fee or tax-funded system. Thorough planning involves examining potential cost increases and compare them with potential savings.

Savings resulting from the change may include:

- o Savings on current disposal costs
- o Savings from extension of the life of existing disposal sites
- o Savings in crews and overtime at transfer, hauling, and disposal facilities
- o Improved utilization (and improved economies of scale) of recycling programs.

The "benefits" described above are often referred to as "avoided cost". Avoided cost refers to money that does not have to be paid as a result of some activity, for instance, disposing of an additional ton of waste. Considering avoided cost allows a complete comparison of alternative investments, and allows planners to design their least-cost system.

Using avoided cost analysis in 1988, Seattle found that the status quo system (landfilling at a local site) was more expensive than investing in very aggressive and expensive recycling programs, and long-hauling the remaining waste to an alternate site.

Local factors affecting cost-effectiveness may include:

- o Costs and lifetimes of specific landfill or disposal alternatives
- o Access to and strength of regional recycling markets
- o How rural vs. urban the collection area is – distance between stops, distance to landfill, distance to recycling markets
- o The portion of collection cost that varies with volume of waste collected.

ISN'T IT A LOT OF TROUBLE TO IMPLEMENT?

A volume-based system is more complicated than some alternative rate systems. However, the steps involved in implementation are manageable. They include:

- o Determining whether state law empowers your agency to bill for solid waste on the basis of volume.
- o Establishing an ordinance that makes solid waste service, or at least charges, mandatory
- o Establishing an ordinance that bans (and penalizes) illegal dumping and burning of waste
- o Establishing the solid waste entity as an enterprise fund (not essential, but can be helpful)
- o Assuring that there are convenient recycling alternatives (public or private)
- o Creating a sensible system of rates on the basis of system costs and desired changes in disposal behavior.
- o Extensive public education/information efforts
- o Preparation for some changes within the solid waste agency, including increased staff in some areas (particularly billing and customer service), changed responsibilities for some employees, and a possible refocusing of the services that the utility offers.

Of course, establishing local political support is a key ingredient in the process.

Some obstacles to successful implementation are peculiar to individual volume based systems. For example, variable can rates can require a complex billing system, and pre-paid bags or tags may require a retail distribution system.

WHAT LEGAL POWERS DO I NEED TO WORRY ABOUT?

New recycling and landfill legislation has helped make a volume-based rate system an appealing option in many states. Existing law can affect the level of difficulty associated with a move to a volume-based rate system.

The legal powers necessary for a solid waste agency to charge for refuse collection on the basis of volume generally either already exist or can be created through a local ordinance, if the local political climate permits. Some states may limit local agencies' power. Unfortunately, therefore, legal questions must be answered on a state-by-state basis.

Several legal situations can affect the ease with which a volume-based billing system can be implemented. Ideally, a jurisdiction considering such a change would have the following powers:

Legal Powers Needed:

- o Power to bill or set/approve rates**
- o Flexibility to perform non-traditional services**
- o Power to prevent illegal dumping.**

- o Power to bill (municipal or contract system) or to set (or approve) rates for refuse franchisee.** This power must include some means of enforcing payment of bills. The power to make refuse service mandatory can also be helpful.
- o Flexibility to perform services other than traditional collection and disposal of refuse.** Laws that strictly limit ways in which refuse system funds must be spent can complicate recycling efforts. Limited recycling options can affect the desirability of a volume-based rate system.
- o Power to prevent illegal dumping.** Although the solid waste agency will probably not enforce illegal dumping laws itself, there must be a strong penalty for disposing of waste outside the system.

The powers listed above are generally available to jurisdictions that currently provide refuse service. Having "flow control", or the power to direct where solid waste in the jurisdiction must be deposited, may also be needed for a smoother system.

WON'T IT CAUSE A LOT OF PROBLEMS?

Changing from fixed fees for unlimited pickup, or from a system where fees are collected via taxes may not be a simple, problem-free process. However, most of the potential problems are manageable, especially if you anticipate them.

Communities considering implementing volume based rates should be prepared to address several of the following problems:

- o Confusion with the new system
- o Resistance from customers who are not used to paying bills or who are unwilling to change behavior
- o Illegal dumping or burning of waste
- o Enforcement of the system
- o Complaints by the poor
- o Contractual or legal limitations on the flexibility of the solid waste agency
- o Change in the responsibilities of your agency and staff
- o Need for increased staff (some temporary increases for analytical tasks, and longer term increases needed in customer service, etc.)

CAN THESE PROBLEMS BE HANDLED?

The answer is that the problems can be significantly reduced -- if you anticipate them and prepare for them.

Customer Confusion and Resistance: Working with the press and preparing mailers can help customers understand the reasons for the change, can help with resistance to behavioral changes, and can help explain the new system. Initial stories about local problems related to solid waste, and about solutions that have worked in other jurisdictions, can help increase understanding of solid waste issues. Repeated mailers, television spots and bus cards can be helpful in reinforcing the new behavior.

Illegal Dumping and Burning: Some increase in illegal dumping and burning can sometimes be associated with variable can rates. Making sure that there are convenient opportunities for customers to recycle waste and imposing regulations

that provide penalties for illegal dumping are helpful. Requiring a minimum level of service and minimum fee for all households can help reduce the problem. In addition, getting a public attitude change that says illegal dumping isn't socially acceptable (like the recent changes in the social perception of drunk driving) could potentially go a very long way in mitigating problems of illegal dumping and burning.

While many areas have had trouble with illegal dumping in response to sharp increases in refuse rates, Seattle does not appear to have experienced a significant problem with illegal dumping or burning of waste. Other large cities may have problems.⁵ However, it is difficult to get a very accurate or quantitative handle on the problem. Seattle does not have a comprehensive program to pick up illegally-dumped waste. Rather, some incomplete information is provided by street cleaning crews, and are subject to complicating effects from seasonal labor availability and other problems. Also complicating the problem is the fact that waste can easily be dumped across jurisdictional lines, and burning can be difficult to detect or trace to its source.

Enforcement: Enforcement may or may not be needed. For many years, Seattle's Solid Waste Utility relied on an honor system for enforcement of service levels. Although it is clear that some customers put out more waste than they were paying for, on-site inspections indicated that the levels of abuse were not high, and were in fact, offsetting.

Seattle's new collection system is much simpler to enforce. The contractors provided 'official' semi-automated toters sized to the subscription level paid for. This system greatly simplified enforcement, because any waste that is not in the official toter is not paid for and is generally not collected, unless it has a pre-paid sticker on it. A decision on enforcement in a particular jurisdiction may be able to be deferred until after the system is in place for a while. However, provisions for enforcement should be included in any contracts, long-term plans, etc.

⁵ There are several factors that may contribute to Seattle's relatively small problem in this area: 1) there are few vacant lots in the City, 2) the Northwest has a strong environmental ethic, 3) the areas has many private recyclers, city programs, and other legitimate ways to reduce the amount of waste that needs to be disposed, and 4) volume-based rates are not new to the area, so customers have had time to modify their behavior.

Low Income Assistance: Volume-based rates usually require the introduction of mandatory charges.⁶ Variable rates are separate and discrete charges which customers may not have seen explicitly before. They may be perceived as a burden to low income customers. Establishing special rates for low income citizens, or building "lifeline" components into the rates will mitigate the impact of mandatory rates on customers with fixed or low incomes. Some jurisdictions offer carry-out or backyard service for curbside rates for elderly customers.

Staffing Considerations: In-house problems can be reduced if management prepares staff for changes in emphasis of the job, for instance realignment of staff toward recycling efforts and away from traditional collection and disposal. Management also need to prepare staff for growth in some areas in particular, some of which will involve permanent increases and some more temporary. Management may be able to cope with some of the burden in areas with short-term workload through the use of temporary labor, or with loans of municipal employees or staff from other sister agencies, or with consultants.

Although these steps take planning, they can set the stage for a very effective solid waste system.

AREN'T THERE OTHER RATE OPTIONS OUT THERE THAT ARE JUST AS GOOD?

No. Volume-based rates are equitable and provide better incentives than rate designs that do not vary the charge with some measure of the amount of service provided. They are fair, provide customers with choices, encourage all types of waste reduction and recycling behavior, integrate well with new recycling and yard waste programs, encourage participation in recycling programs without making them mandatory, and can lead to an extension of the life of existing landfill space.

As a comparison, many jurisdictions are considering offering recycling credits, which reduce garbage bills for people who participate in specific recycling efforts or programs. While credits may be better than nothing, they are not the best alternative because the amount of the credit is fixed, and does not give customers an incentive to recycle more. In addition, credits for participating in "official" recycling programs do not encourage careful buying in the first place (many jurisdictions' first priority for waste reduction), backyard composting, re-use, or recycling through private firms.

⁶ Requiring a minimum service level may lessen the illegal dumping incentive. Mandatory service also prevents customers from going around the system (and fees) by dumping directly at landfills or transfer stations.

WHAT ADDITIONAL CONSIDERATIONS ARE INVOLVED IN DESIGNING THE RATES?

System Design Decisions

- o Choice of Bag/Tag vs. Variable Can System
- o Subscription vs. Usage
- o Steepness of Rates
- o Payments for "Extras"
- o Curbside vs. Backyard Differentials
- o Charges for Recycling or Diversion Programs
- o Rates for Multi-family Buildings
- o Rates for Compacted Waste
- o Alternatives for Low Income Households

Choice of Variable Can vs. Bag/Tag Systems: The selection of the type of volume-based rate system will depend on the evaluation of the tradeoffs of several factors in the context of the jurisdiction's situation, including:

- o Equity
- o Complexity, implementation considerations, cost, and
- o Revenue Stability.

There are pros and cons for each of these systems, and jurisdictions need to weigh their particular needs.

A "variable can"-based system may be a good option for areas using semi-automated toters, areas with problems of animals or rapid spoilage, places already using a can system where customers may already own their own cans, or where a flexible billing system is in place or can be borrowed from another utility. Variable can rates also show customers the full cost of disposal in one bill. Can systems may provide more stable revenues than bag systems, and may be easier to forecast. Especially important is the fact that variable can rates also allow a great deal of flexibility in the pricing increments between can subscription levels. The jurisdiction can implement rates that provide very aggressive recycling/waste reduction incentives with this system.

However, a variable can system has fairly high implementation costs, particularly because of the complexity of the billing system needs. A fairly complex computer system is needed that will keep track of each customer's selected subscription level,

and will calculate bills accordingly. In addition, customer service costs may be higher, and some confusion on the part of customers is fairly likely because subscription levels will need to be selected.

Bags or pre-paid stickers generally charge for smaller increments of waste than a variable can system, letting customers pay more precisely for the amount of service they use. This provides a better link between customer behavior and the bill they pay, and allows a better waste reduction/recycling incentive. In addition, the purchase of the bags may provide a more immediate price signal to customers. The billing system is much simpler, and customer questions and confusion can be lower than with a variable can system. Enforcement may also be simpler. Although bags are generally easier for collection staff to dump, allowing the bags or stickered waste to be placed inside cans may help alleviate animal problems where that is a difficulty.

Selection Between Variable Can and Bag/Tag System	
<u>Variable Can System</u>	<u>Bag/Tag System</u>
<ul style="list-style-type: none">o Based on subscribed serviceo Full cost on billo Flexibility in pricing incremental 'can' levelso Relatively high billing, customer service, enforcement, and implementation costs	<ul style="list-style-type: none">o Pay for service actually usedo Immediate price signalo Limited flexibility in pricing incremental bagso Fairly easy to implement and enforceo Size limits must be established

A bag or tag system will require the jurisdiction to set up a distribution system for pre-paid garbage indicators, but allows the jurisdiction to avoid the cost of a billing system. The jurisdiction must also establish and communicate (and presumably enforce) clear limits on the size of items that may have stickers attached. However, a bag system limits the agency to equal price differentials no matter how many bags are put out by a household. This restricts the jurisdiction from charging increasingly higher rates for additional waste.⁷

⁷ This can be mitigated to some degree if the household is issued a fixed number of bags per year at a certain rate, but then additional bags are available at a higher rate.

If the jurisdiction attempts to charge for all the costs of disposal through the price of the bag, it runs the risk of not recovering the system's fixed costs. It may be more prudent to charge for the fixed cost of the collection/disposal system through a separate charge to customers, and keep the cost of the bags closer to the 'variable' cost of the system (generally disposal). In this latter case, the "fixed" portion of the system costs would be recovered through a "customer charge" on a regular periodic bill, or through a tax mechanism⁸. Then bags or stickers could be purchased for an additional fee that would reflect the "variable cost" of the system, and would show customers a savings if they dispose of less waste (use fewer bags or stickers). Charging separately for the fixed portion of the collection/disposal system assures that the fixed costs of the system will be recovered, and the system will remain solvent. Attempting to charge for all costs on the price of bags can lead to revenue instability and potential financial insolvency.

Choice of Subscription vs. Usage-based system: The best incentives are provided by systems that charge customers based closely on the actual amount of waste disposed. In this way, the customer's behavior is more directly associated with the amount paid. A traditional subscribed system does not provide this incentive, because their payments do not vary with weekly variations in waste. A pre-paid bag/tag system does provide charges based on usage. Another option is to have collectors record the number of items at each pick-up, and bill on that basis.

Pre-paid bag or tag systems are a good option, especially in that they may offer charges based on smaller increments of waste and make it easier for customers to vary the amount of waste they put out. However, the system must allow for the recovery of fixed costs in some manner, either included in the price of the bag or perhaps through an additional "customer charge".

Subscription systems don't allow charges to vary based on the amount actually put out for collection week to week, and may provide an incentive to completely fill up the cans or bags paid for. These weaknesses may decrease the recycling incentive. However, subscription systems can also work to remind customers to reduce to that subscription level on weeks when waste might be higher. Subscription systems are often easier to implement than systems that require the recording of items for each pick-up, and provide revenue stability. Providing the option for pre-paid stickers or bags in conjunction with subscription systems can improve the flexibility of the system for customers with occasional higher garbage levels, and may reduce the risk of illegal dumping.

⁸ The jurisdiction could charge this customer charge through its existing revenue mechanism.

Steepness of the Rate Structure: The steeper the extra charge for additional waste, the greater the incentive to recycle. Jurisdictions may wish to steer clear of excessively steep rates for two reasons.

1. An increased incentive to dump illegally.
2. Uncertainty of revenues.

Higher rates on extra service levels provide an incentive to reduce waste disposal by a variety of means. Presumably, convenient programs may mitigate the problem of customers selecting undesirable means of reducing waste, but the higher the cost, the greater the incentive for customers to dump waste illegally.

Fixed costs of the system are incurred no matter what level of waste is disposed. Pure cost-of-service pricing would not tend to lead to steeply increasing rates. This arises for several reasons. One of the largest costs of providing solid waste service is getting the trucks and labor to the house, a cost that will not vary much with how much waste is put out for collection. In addition, many landfills are not priced at a level that reflects the full cost of providing service.⁹ This will tend to reduce the steepness of the rate structure because a large component of the variable cost (the landfill fee) is underpriced compared to the long-term fully-inclusive price of disposal.

The revenues for higher levels of waste are generally less certain. In fact, the rates and recycling programs are designed to reduce these higher levels of waste. Departing from cost of service by shifting fixed costs to increase the steepness of the rates may increase the risk of the jurisdiction not recovering the system costs. Including these fixed costs through a customer charge or integrating them into the "first-can" rate helps assure the agency's financial solvency, but will lead to rates that are less steep.

⁹ Many jurisdictions do not charge appropriately for all the costs associated with adding tonnage to a landfill. Costs that are often undervalued or omitted include ultimate landfill closure costs and the cost of siting a replacement landfill.

Selecting the steepness of the rates requires balancing:

Increased recycling/waste reduction incentives

vs.

**Increased incentives for illegal dumping
and revenue uncertainty**

Seattle instituted rates that are higher than cost-of-service for higher subscription levels, and this approach was favored by the Utility, policy-makers, and citizen groups. The amount of excess funds that were projected to be collected from customers subscribing to higher can levels were used to reduce the rates for lower can levels. This approach allowed Seattle to enhance its waste reduction and recycling incentive in two ways: first, by implementing an enhanced 'penalty' for large amounts of waste; and second, by increasing the 'reward' for disposing of small waste volumes.¹⁰

Payments for "extras": "Extras" are cans or bags of waste that customers dispose of in excess of their subscription levels. Under a subscription or variable can approach, a system of payment for extras must be established to allow honest customers to dispose of occasional extra garbage conveniently without illegal dumping.

Care must be taken to assure that the price of one "extra" is greater than one-fourth the cost of an additional permanent monthly service level (with weekly service, or four pickups in the month). This becomes more complicated if the dollar differentials between service levels are not constant across service levels, and if the differentials vary for curbside vs. backyard service.

Differentials for Curbside vs. Backyard Service: Generally, backyard or carry-out service is more expensive to provide than curbside or alley service. Allowing customers to select -- and pay for -- the service arrangement of their choice can save your system money and provide more service options to customers. The savings may help pay for the switch to volume-based rates.

¹⁰ However, care must be taken in implementing this 'enhancement'. Recall that the revenues for higher subscription levels are less certain, while subscriptions at lower can levels are very certain. As the subsidy increases, the agency increases the chances it will not recover the fixed revenues needed to run the system.

Jurisdictions currently show a wide range of differentials for these service differences. Some charge only cost-of-service differentials (perhaps 10-20%). Others charge as much as four times as much for backyard service. No matter what the differential, jurisdictions report that at least 85-90% of customers select the lower-priced service. Seattle charges 40% more for backyard service, and found that over 95% of customers selected curb/alley service. Allowing customers to choose the service type gives them control over the size of their bills and continues the principle of providing a direct relationship between customer behavior and the size of bill.

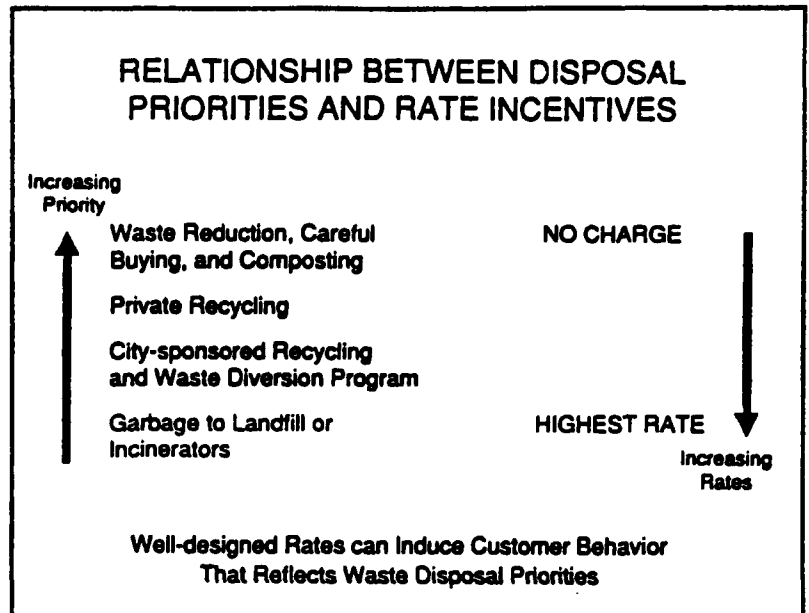
Charges for Recycling or Diversion Programs: One controversial area is whether jurisdictions should charge separately for recycling or diversion programs. If these services are provided, but not separately charged, the costs will be included in the basic garbage rates. Not charging may enhance incentives to sign up for these programs.

However, there are strong arguments that this may not be an equitable system. Customers who do not use the program are charged. Although the jurisdiction may seek to penalize customers who do not use the City's programs and do not recycle or work to reduce their garbage, it is less clear that they would want to extend those penalties to customers who reduce their garbage through private recyclers or who reduce waste through careful purchasing or re-use. If the charge for recycling programs is included in the basic customer charge, then the likelihood of recovering the program costs is high, but these inequities are exacerbated. If the charges are put on higher subscription levels, the penalties are directed more accurately at customers who dispose of a great deal of waste, but the program costs are less likely to be recovered, affecting financial stability.

Indeed, as the solid waste jurisdiction is more successful in diverting waste from the landfill disposal stream to recycling and diversion programs, it reduces the revenue base (number of cans or bags) over which to spread recycling costs, so the extra cost per unit must increase. The result could be a system in which, as people recycle more, they pay higher and higher garbage fees.

To avoid finding itself in this situation, the jurisdiction should consider charging a separate (but relatively lower) fee for City-sponsored recycling, yard waste collection/composting, and diversion programs. The fee may not recover all the costs of the programs, but should provide an incentive for taking care of the waste through careful purchasing (so that the waste is never produced in the first place), private recycling programs, or other ways to remove the waste from the city's waste

and recycling system.¹¹ As the job of the solid waste jurisdiction changes from one of solely disposing of waste to an integrated system of waste disposal as well as waste diversion and recycling, it may be appropriate to charge customers some portions of the cost of these additional services, since a fee-for-service approach provides greater long-term financial stability and gives customers greater control over their bills. However, that doesn't mean it is inappropriate to provide some level of subsidy to these programs from garbage revenues. This approach reinforces the waste disposal priorities that have been adopted in most jurisdictions.



Seattle provides a curbside recycling program for no additional charge,¹² but charges a \$2.00 monthly subscription fee for the City's weekly curbside yard waste collection and composting program. This charge is considerably below the \$9.00 charged for an additional subscription level. The fee has not proved to be a big deterrent to participation -- over 62% of customers signed up for the program. Customers have accepted the idea of paying for this diversion program.

Rates for Multi-family Buildings: Rate options for multi-family buildings can be complex for any utility, but may be especially so for solid waste service. The problems include:

- o The tenant, or garbage-producer, is often not the bill-payer, so the rate incentives are diluted and indirect.
- o Garbage is usually disposed of in a joint area, so tenants may not feel responsible if they over-dispose of waste because of the problem of determining which tenant is responsible.

¹¹ This approach may also mitigate the amount of harm to any existing private recycling enterprises, and the potential for political fallout.

¹² The cost of the recycling programs and planning are covered through the garbage fees.

- o Rate equity can be difficult to maintain if two different systems (cans or bags; vs. dumpsters) are available.
- o Maintaining equity between multi-family and single-family rates as well as between large and small multi-family buildings can be complex.
- o The fact that some costs may be properly allocated on a building basis (e.g. the stopping of a garbage truck), some on a household basis (e.g. landfill closure), and some on a volume-basis (e.g. disposal) makes designing rates for multi-family applications much more complex than for single-family buildings.
- o Offering a high degree of choice in subscription levels may complicate both billing and enforcement.

It would be possible to bill multi-family buildings on a fixed-fee basis (either per-building, or perhaps more fairly, per-household). However, that approach would eliminate any possibility of providing signals to either the property owner or the tenants that reducing waste is a benefit.

Although the multi-family sector poses special problems, there are at least two possible volume-based approaches that may be practical in multi-family buildings:

- 1) A bag or tag system, perhaps with a per-household customer charge,¹³ or
- 2) A variable can subscription approach.

Either system could be set up so that the owner is generally charged based on the volume generated per complex. However, the former system has the possibility of passing some of the direct incentives to the tenants. A per-household charge may be assessed through a bill or through the property taxes.¹⁴ Then all the waste that is in official pre-paid bags or that is tagged with pre-paid stickers would be picked up. Presumably tenants could be made responsible for paying for the bags. This system would tend to get some of the waste reduction incentives inherent in the rates to the waste producers.

However, realistically, some buildings may need enforcement efforts to try to reduce the amount of waste that is disposed in unofficial bags or waste that is not tagged. This may be a problem, especially in larger, more anonymous buildings, and the relevant ordinances may need to make the landlord ultimately responsible for paying for this waste.

¹³ The customer charge would probably be billed to the building owner.

¹⁴ If used, this charge would generally be the landlord's responsibility.

A variable can system is another alternative. Seattle's system of multi-family variable can rates, in place since 1981, is complex. The City's billing system maintains records of the number of apartment units in each multi-family building and requires the building owner to select a subscription level.¹⁵ The multi-family rates are charged with a structure that is identical to the single family rates for each apartment unit.^{16, 17} The system is very confusing and inflexible. However, the biggest weakness of this system is the fact that if one tenant is a strong recycler, he/she cannot generally reap the benefits of that behavior -- the system is unable to get the recycling incentive directly to the tenant.

Generally, the rates are included as part of the rent, so the incentives are very diluted. If the objective is to induce customers/tenants to reduce waste, some non-rate options may need to be employed. Passing an "opportunity to recycle" ordinance requiring each complex to provide a convenient recycling opportunity may assist in increasing recycling by these customers. Diversion credits may be appropriate. A jurisdiction may choose to try alternatives on a small-scale or pilot basis to find the option that works best in its area.

Rates for Compacted Cans or Dumpsters: There may be a case for charging differential rates depending on whether waste is compacted or not. If landfill charges are weight-based, this may be especially appropriate.¹⁸ However, in many cases, compacted waste may not incur extra disposal charges, and therefore may be priced the same as uncompacted waste.

In cases where a differential is appropriate, practical considerations may make it impossible to charge additional amounts for compacted waste in cans, but may

¹⁵ The system gives owners two options. They may either sign up for a number of cans that is equal to or larger than the number of units in the building (a five-plex may sign up for five, six, seven, etc. cans). Alternatively, the entire building may sign up for the mini-can service (that same five-plex would pay for and receive five mini-cans of service per week).

¹⁶ Prior to 1989, Seattle charged multi-family rates lower than those charged to single-family households to account for savings related to fewer stops and the 'clustering' of cans. However, the most recent analysis showed these savings were very low and the lower rate was eliminated.

¹⁷ Therefore, a five-plex building subscribed to six cans would pay for five full one-can subscriptions (including five customer charges) plus one additional can rate.

¹⁸ However, for the most part, transfer and hauling costs may vary more on the basis of volume more than weight.

allow additional charges for compacted dumpsters. This is the case in Seattle. The Utility pays per-ton fees for landfill disposal and the Utility charges an additional fee for compacted dumpsters, which brings dumpster rates closer to cost of service. Seattle deals with compacted cans through a weight limit, which allows the City to deny pick-up to gross weight-limit violators.

Options for Low Income Households: When mandatory fees are required, social concerns may make special rates for classes of low income customers appropriate. They are used by both electric and water utilities. If considering such a program, the jurisdiction may want to consider:

- o alternate eligibility criteria -- all low income, low income with children, low income elderly or handicapped, medical eligibilities, etc.
- o the effect of alternate rates on billing system cost and efficiency
- o how to determine eligibility.
- o whether the rates should be lower throughout all volume-levels or whether discounts should be truncated after a "basic" level of service.
- o whether aid should take the form of lower rates, special services (such as free backyard collection), or emergency funds.
- o which classes should pay for the rate subsidy, and which rate subsidy design is most equitable to all customers.

BUT VOLUME BASED RATES AREN'T PERFECT, ARE THEY?

No. An enhancement of usage-based systems, metered systems that would allow customers to pay for the exact amount¹⁹ of waste they dispose, would be better. Systems based on smaller increments of waste are better, and could provide recycling incentives that are more volume-sensitive. In addition, the more immediate the payment, the more reinforcement provided. A more immediate payment for solid waste service provides a stronger message to customers. Also, the current variable rate alternatives present some inconvenience to customers: either they must decide on a "normal" subscription level and call for changes; or they must purchase and have on hand adequate supplies of bags or tags.²⁰ Finally, volume-based measures may not be the best unit to reflect the manner in which some jurisdiction's costs are incurred.

¹⁹ and even type of waste

²⁰ Both systems also represent some inconvenience for the jurisdiction. They may need to carry inventories of various can sizes and deliver them, or they must have a network for providing bags or tags as needed.

However, trade-offs with ease of implementation and understandability must be made. Workable compromises include a subscribed variable can system (augmented, for flexibility, with pre-paid stickers for extras), or the pre-paid bag/tag systems used in a number of jurisdictions.

One of the major objectives of variable rates is to establish a link between a customer's solid waste disposal choices and the bill that the customer pays. This is the key to providing an incentive to reduce the amount of waste disposed through waste reduction and recycling. Variable rates systems, unlike tax methods or systems with fixed bills for unlimited service, provide these incentives.

The volume-based methods of variable garbage rates discussed above are in place now in a number of communities. They have generally worked very well, and have provided far superior incentives for waste reduction and recycling. Some modifications to the current volume-based methods could be considered. Variable can systems could be modified with a variety of smaller can sizes -- half cans, quarter cans, etc. A variety of bag sizes could be introduced. This would not solve the inconvenience problems that exist, and would not necessarily provide the flexibility needed to maximize the waste reduction and recycling incentives.²¹

A system is always going to involve tradeoffs. Systems that are flexible are also generally complicated. Systems that are very convenient are generally expensive. Bag/tag and variable can systems provide many system benefits and have proven to be very workable in a variety of cities. They provide good recycling and waste reduction incentives, yet are reasonable to implement and explain to customers.

HOW DO I GO ABOUT DETERMINING WHETHER THIS SYSTEM WILL MAKE SENSE IN MY JURISDICTION?

Making a decision about whether a variable rate system makes sense in a jurisdiction requires recognizing that the rates structure is a critical piece of an integrated solid waste management system. A move to a variable garbage rate

²¹ Experiments with weight-based rates are being conducted in two jurisdictions - Farmington, Minnesota, and an EPA-funded experiment in Seattle, Washington. These projects are attempting to test the feasibility of retrofitting garbage collection trucks with scales and electronic bar-coding equipment to allow billing of residential customers by the actual number of pounds of waste disposed in their garbage can. Pounds represent smaller increments of service, so the recycling incentive is strengthened, and this type of program would be convenient for customers.

system is often viewed as an accompaniment to a recycling system. Analyzing the impacts of such complex and interrelated changes may seem an overwhelming task to the local jurisdiction. In addition, because every solid waste jurisdiction is different, there is no one rate and system configuration that can be implemented "as is" into other jurisdictions. The decisions on system changes and design must be made in the context of the jurisdiction's situation.

For those jurisdictions interested in pursuing an analysis of whether variable rates make sense in their jurisdiction, there is a companion volume to this report. This volume is entitled Variable Rates in Solid Waste: Handbook for Solid Waste Officials, Volume II - Detailed Manual²². The second volume is designed to assist solid waste officials in analyzing a number of aspects related to making decisions about solid waste system changes, with detailed emphasis on factors related to changes in the fee system.

The second report is fairly long and detailed, but addresses the variety of issues that the jurisdiction must consider in evaluating the feasibility of a variable garbage system. It then walks the reader through the steps needed in determining appropriate design of the rates, determining the level of the rates, and associated timeline and implementation issues.

The companion manual, Volume II, is divided into six parts.

Part I: Feasibility – Does a variable fee system make sense for our jurisdiction?

This part discusses financial factors that will help determine whether implementing a variable rate system makes sense for a particular jurisdiction. This includes an analysis of the variable cost of collection and disposal, costs associated with waste diversion, and an analysis of the net costs or savings. It helps guide the reader through the techniques involved in preparing a cost-benefit analysis of variable rates and an integrated system. In addition, it addresses the political, legal, financial, and community relations feasibility of a system change.

Part II: Rate Design Considerations – Which variations on the basic fee system make the most sense for our system?

This part assists a jurisdiction in making preliminary system rate design

²² This grant-funded volume is available for the cost of reproduction and mailing. An order form is included at the end of this report.

decisions and tradeoffs in terms of equity, incentives, implementation, revenue considerations, and a variety of other factors. This section examines a number of configurations and options for flat and variable fee alternatives, and examines options for special customer groups. These basic structural decisions are necessary before a detailed cost of service or rate study can be conducted. This part also contains a fairly extensive analysis of the two primary volume-based rate alternatives, the variable can and bag/tag systems.

Part III: Conducting a Rate Analysis -- How do we determine rates that cover our costs of service and provide effective incentives to the customers?

This part walks analysts and decision-makers through the basic steps and analyses needed to estimate a coherent system of rates for solid waste services. The section discusses the complications of estimating the amount and types of solid waste service that customers will demand, determining revenue requirements, and the steps in making decisions on cost allocation and rate design that will affect the ultimate calculated rates that the customer will see and presumably react to.

Part IV: Operational Changes -- Once we decide on a system and rates, how do we go about implementing it and how long will it take?

This part discusses the operational changes that must be planned for and implemented based on the fee system selected. It discusses timetables and considerations for needed changes in the collection system, customer service and billing system changes, and changes in planning and other staff.

Part V: Case Studies -- What are examples of other systems with variable systems in place and what can I learn from them?

This part summarizes basic characteristics of the rate structures and systems in a number of other solid waste jurisdictions, including large and small systems, and systems with private, contract, municipal, and franchise or licensed collection. An evaluation of these case studies may provide insights into the appropriateness or success of particular system choices in jurisdictions with a variety of characteristics.

Part VI: References and Appendices

This part of the report includes a bibliography of helpful readings, worksheets, and computer aids.

SUMMARY

Many solid waste jurisdictions are facing tough challenges. Landfill space is becoming a problem, and jurisdictions need ways to reduce the amount of waste going to increasingly expensive disposal facilities. Expensive recycling programs are being under-utilized. Variable rates give an economic incentive for customers to reduce the waste they dispose of, and provide incentives for recycling and waste reduction.

Variable rate systems are fair and effective, and provide a number of other advantages, including:

- o they can be implemented in a variety of situations
- o the rates can be implemented relatively quickly
- o variable rates can lead to system savings, and
- o they integrate well with other programs, increase participation in recycling programs, and reinforce waste-reducing behavior.

There is no doubt that, from a variety of perspectives, many jurisdictions could benefit from replacing their current fixed-rate systems with volume-based rates.

Variable rate systems work, and make a great deal of sense from a system perspective. Variable can or bag/tag rate structures have proven to provide very effective recycling incentives in a number of communities. Seattle's variable can system has been one of the City's most effective recycling programs. The rates are a vital part of the Seattle's integrated solid waste system, and have allowed that Utility to set an aggressive, but achievable, 60% recycling goal. Seattle's customers have responded well to a rate structure that gives them alternatives and control, and they have responded with high levels of private recycling, very high participation levels in City-sponsored programs, significant reductions in service levels, and significant decreases in the waste brought to landfills. In jurisdictions across the country, customers can become an integral part of the solid waste system and an important key to a solution to solid waste management problems.

The rest of this volume summarizes the topics covered in each part of the companion volume, as well as its general conclusions.

OVERVIEW OF VOLUME II - DETAILED MANUAL

SUMMARY OF PART I - FEASIBILITY

Determining whether a variable rate system is a feasible proposal for a community requires examining the financial impacts; political and community relations impacts; legal requirements and flexibility; and whether a change can be financed.

The financial feasibility analysis is based on the concept of avoided cost. The avoided cost is the amount of money that the jurisdiction may save by not disposing of one additional ton of waste, or the variable costs of the refuse disposal system. The costs that may be avoided may include reduced collection costs, transfer costs, or landfilling or processing costs.

The analysis will require a calculation of the current system's costs involved in disposal of solid waste. For most systems, that will include both costs for collection of waste plus costs of disposal. The level of the variable costs associated with the collection systems will depend on whether the collection is municipal, contract, franchised, or private. These will affect the structure of the costs, and the amount of labor and collection equipment savings that may be realized. The variable portion of the disposal costs depends on which portion of the costs in each part of the disposal system are avoidable. Some or all of the following costs will figure into the avoided cost calculation for the disposal (landfill or waste-to-energy) system, including:

- o transfer station costs
- o hauling costs
- o current tipping fees
- o future tipping fees
- o landfill closure and re-siting
- o environmental costs
- o cost of "put or pay" guarantees.

Variable rates provide an incentive for customers to find some way to put less material into their garbage cans. This will likely involve some combination of recycling, reducing waste through careful purchasing and reuse of products; and possibly illegal dumping and burning.

A number of factors will affect the waste diversion costs, including:

- o Recycling program convenience and cost: Programs that are more convenient to customers will achieve greater participation. However, convenient programs also tend to cost more. Participation and convenience will both affect the cost of the diversion program.
- o Costs under different recycling arrangements: Whether the program is offered through municipal staff, via contract, franchise, or private services will affect the cost of the recycling programs.
- o Volume to be achieved: The types and recovery rates of the materials collected will affect the costs of the programs and the revenues to be realized.
- o Waste reduction costs and effectiveness: More effective waste reduction will lower the economic and environmental costs associated with solid waste management.
- o Illegal dumping: The costs of coping with the effects of any additional illegal dumping or burning should properly be considered in the analysis.

By comparing its particular costs of disposal vs. the costs of diversion, a jurisdiction can determine whether the variable rates and their inherent recycling incentives will probably be of financial benefit to the community.

However, there are other factors than financial impacts that also affect the feasibility of introducing a variable rates system. These include political feasibility and the impact on community relations. The basic tenet in this area is that it is critical that the jurisdiction keep the public well-informed. This has two benefits: a system change is more likely to be accepted; and well-informed customers will be easier to serve. Volume II includes strategies for customer information, as well as a timetable for a public relations plan.

Whether a variable rates system is feasible will also depend on the legal situation in the community. Jurisdictions that have or establish the following legal rights will be able to implement variable rates more easily:

- o Power to bill or set rates for refuse services
- o Flexibility to perform services other than traditional collection and disposal of refuse
- o Power to prevent illegal dumping.

Finally, to the extent that the jurisdiction must find funding for some of these changes, it will be necessary to explore financing options. The jurisdiction may wish to explore a combination of grants, bonds, advance billing, customer deposit, user fees, surcharges, taxes, per capita fees, general fund, leases or leasebacks, or contracting.

SUMMARY OF PART II - EVALUATION OF SOLID WASTE RATE DESIGN OPTIONS

When a jurisdiction begins to consider modifying its solid waste system by introducing variable rates or designing recycling programs it will generally want to analyze a broad range of solid waste rate design options and their implications on the new system. In this part, a wide variety of rate design options and issues are discussed and evaluated in detail. Both conceptual discussions and evaluations of operational options are considered. Each jurisdiction should examine the options and decide on the integrated system that best suits its particular situation.

Rate design options should be evaluated on the basis of their performance on several important criteria:

- o Recycling and waste stream reduction incentives
- o Equity and economic efficiency
- o Customer service, stability, and acceptability
- o Implementation and maintenance-related criteria
- o Enforcement
- o Revenue-related criteria.

The analysis of the options led to the following general conclusions:

- o Volume-based rate options (either a bag/tag or variable can system) provide much better and more consistent waste reduction incentives than the simpler fixed-fee alternatives. Volume-based rates encourage a wide variety of waste reduction and recycling behavior, and do not favor any particular program. They are fair and understandable, and are reasonable to implement.
- o Bag/tag systems have some advantages because the charges come closer to reflecting actual usage of solid waste as opposed to charging for subscribed levels of service. They may be especially appropriate in smaller and medium-sized jurisdictions because they do not generally require complicated billing systems, and the systems are fairly easy to implement.
- o Steeper rate structures (those that charge relatively higher amounts for additional service levels) will enhance the recycling and waste reduction incentives, but within limits. After a point, steeper structures will tend to make illegal dumping too attractive, and the risks of not recovering the revenue requirements becomes too large.

- o Offering both backyard and curbside service options is preferred from a customer service point of view. However, a higher rate should be charged for backyard or carry-out service. This allows customers to select the level and type of service they want, and gives them control over their bill.
- o In conjunction with selecting a volume-based rate system, there is almost certainly a need for a service level smaller a full can, and perhaps a need for a smaller-than-standard bag.²³ A very significant portion of customers can, through careful buying and recycling, reduce their service needs substantially, and it is counter-productive to 'truncate' those recycling incentives at too high a service level. It may not make sense to offer the more unrealistic 'zero service' option. In addition, providing a smaller volume container is probably preferable and less confusing than offering bi-weekly pickup of waste.
- o A recycling credit is not a very useful enhancement to a volume-based rate unless there is a need to draw attention to a jurisdiction-sponsored program. Variable rates generally provide a more effective recycling incentive.
- o Structuring the rates in the jurisdiction with a 'fee-for-service' perspective is probably the best long-term approach. That includes charging a separate (but smaller) fee for the use of recycling, yard waste, or other programs. This enhances rate stability, and provides the most appropriate price signals for customers' waste disposal decisions. It also gives customers control over their bill, and assures that their behavioral decisions are accurately reflected in their bills.
- o If feasible, and if costs at the jurisdiction are not totally volume-based, it may be fair to charge slightly higher rates to customers with compacted waste.
- o Some system of reducing the burden of the rates to segments of the low income population may be appropriate.

These recommendations are based on an evaluation of several important criteria, but will not be the right answer for every jurisdiction. There are tradeoffs and issues

²³ Especially in areas with mature programs.

associated with each rate and system option. Each jurisdiction should evaluate the recommendations and alternatives in the context of the particular conditions in effect in its area.

SUMMARY OF PART III - CONDUCTING A RATES ANALYSIS

Part III discusses the process and techniques for conducting a solid waste rates analysis. This part walks the reader through in conducting an integrated rates analysis. There are four basic parts of a model to calculate rates. Part III highlights both the basic steps along with some of the complexities associated. It also contains numerous examples and illustrations to try to simplify the concepts.

The process of establishing rates involves four basic steps.

Module 1 - Demand: This step analyzes the demand for each type of service offered for each customer class. Depending on the sophistication of the analysis, the demand module may include a variety of socio-economic variables, estimated equations and relationships, and starting values for the variables.

The demand section generates estimates of a number of variables that are used in the modules that follow. The work requires stepping through an analysis of estimating customer counts, tonnage by type of service, forecasting recycling tonnage and participation, disaggregating by customer type, and estimating variable container subscriptions or purchases of bags.

Because the demand module contains a great deal of information that is likely to be new to jurisdictions which do not use a volume-based rate system, the description of this module is fairly long and detailed.

Module 2 - Revenue Requirements: This step analyzes the costs that would be incurred meeting the demand for services estimated in the demand module. The revenue requirements module evaluates all the activities that would be required to provide the services on a cost-center basis.

The module considers staffing and equipment requirements, production and cost relationships, and estimates the total costs. These, along with financial considerations, provide an estimate of the total amount of revenues that need to be collected from all sources, including rate and non-rate revenues. Some of the costs will be relatively fixed; some will vary based on relationships. Specific costs may vary based on the tonnage, number of customers served, proportion of costs that

are fixed vs. variable, short-run vs. long run tradeoffs, the proportion that are capital expenditures, the varying effects of inflation, and other factors.

The revenue requirements analysis needs to include every cost associated with running the agency and providing service because the rates that are calculated must produce enough revenue to cover those costs.

Module 3 - Cost Allocation: This module determines the way in which the calculated total revenue requirements of the system will be borne by the solid waste jurisdiction's customers. It generally attributes costs and non-rate revenues to each customer class served based on the type and amount of service delivered, and assigns costs both between rate classes, and within rate classes.

The first step allocates costs between rate classes. For each customer/service group or rate class (and subcategories) the cost categories are assigned by one of several possible allocation methods. Costs might be allocated on the basis of the number of customers, number of households, tonnage, proportionally, or some other method. The result is a three-way "between categories" allocation matrix. Each jurisdiction will determine an allocation mapping that is appropriate to its own situation.

The first stage of the allocation established criteria for assigning total costs to each of several general customer groups. For each of the customer categories and each of the types (and components) of rates charged, the costs that were assigned to that customer class are then allocated between the customers within the class and among the set of components of the rates.

Note that cost allocation includes a great deal of judgment. The way in which costs vary precisely based on which customers is often far from clear. A variety of allocation methods are available, but there are also discretionary and policy factors that may come into play. Examples are given below, but the ultimate allocations for a jurisdiction must reflect information about its specific service and customer patterns, and its policy and rate design objectives.

Module 4 - Rate Design: The rate design module determines: the form and components of rates for the various customer classes and services; and the relationships between rates that will be equitable and provide for consistent incentives.

Rates must be assigned to all customer types and services. Some will be based on actual cost of service. Others will be apportioned based on formulas. Policy considerations will determine whether subsidies are appropriate for some customer

sectors, or whether the jurisdiction wishes to deviate from calculated cost of service to generate variable rates with higher recycling incentives.

The solid waste jurisdiction needs to determine which customer sectors will be charged for service via a strictly per-ton rate, which will be charged on the basis of number of visits, which will receive subsidies or penalties based on incentives, and which will have rates with other designs. It will also determine the structure of subscription-based rates. Then the module calculates the levels of rates that will recover the amount of revenues needed from each customer class and service type.

Equilibration: Going through these steps once will produce a set of rates, tons, costs, revenues, and services. Generally, the series of steps must be performed several times before the system reaches "equilibrium", or achieves a set of consistent answers that lead to only small changes when the modules are run again and the steps recalculate results.

Each of the modules contains assumptions, relationships, and calculations that depend on the particular jurisdiction's situation. Because no two solid waste jurisdictions are alike, even in the basics like services, costs, and customer types, each rates model will be different. This section discusses some of the basic approaches and generic relationships, which must then be tailored to the particular jurisdiction being modelled. One thing to remember is that judgment is an important part of all of these analyses. Equations are not a total substitute for "knowing" the particular solid waste jurisdiction.

Moving to an integrated solid waste system with variable rates will involve a considerable amount of staff work. The solid waste system, its customer groups, revenue sources, services, and costs must be examined in detail and the relationships understood by staff. The complexity of the solid waste system determines the sophistication of the computer tools needed to complete the analysis. However, the costs during start-up may be recovered in later years, and in general, the overall system will be fairer and more sound in the longer run.

SUMMARY OF PART IV - OPERATIONAL CHANGES

Part IV of the Detailed Manual describes the significant changes that may be necessary to successfully implement different variable rate schemes in a community.

Implementation of a new rates system will include significant changes in several major areas. Some of the costs will be one-time, and others will be on-going.

Collection and customer service: Changes for collection and customer service staff will depend on the system design decisions made, especially in the following areas.

- o Enforcement: The type and level of impacts will be based on whether the jurisdiction opts for: an honor system; company (or city) can system; pre-paid bags or tags; or route books. These options have varying impacts on equipment, collectors, and customer service.
- o Number of service levels available.
- o Number of other service options available: (e.g., backyard vs. curb)
- o Whether exemptions and discounts are available.
- o Whether other programs are being implemented at the same time.

Billing system: The level of changes that the system imposes because of billing system needs will vary based on a number of related factors. The time for implementation varies as the complexities increase.

- o Whether a bag/tag system is put in: Unlike a variable can system, this option does not generally require a complicated billing system.
- o Billing flexibility needs: The number of services, the complexity of the charges, the number of customer classes, and other factors will have a significant impact on the cost of a billing system and the changes that will need to be planned for.
- o Data gathering requirements: The more information that must go into or be able to be output from (either on-line for customer calls or for analytical purposes), the more complex will be the billing system.
- o Whether an existing billing system (e.g., for another city utility) might be available to share.

Planning Department: A number of changes in the planning department will be needed with the added complexities of a new rates and/or solid waste management system. New staff and computer equipment will likely be needed because the jurisdiction will need to design and calculate more complicated rates, and track the performance of the system. Consultant services may also be a good idea, especially at the initial stages.

Timelines:

This section also presents information on sample timelines for implementation of solid waste rates or system changes.

An ideal timeline for a complex change would allow something more than two years

for implementation. That may not always be possible with legislative, political, or disposal facility pressures. A fairly significant set of system changes was planned and implemented in Seattle in about 14 months, but that was a modification of an existing variable can system.

A switch from a fixed-fee system to a bag/tag system was fully implemented in a small community in about 9 months, including all planning, analytical, customer contact, and implementation work.

SUMMARY OF PART V - CASE STUDIES

Part V, containing case studies, is divided into three sections. The first section contains a very detailed discussion of the solid waste system in Seattle, Washington, which introduced variable can rates in 1981. This section examines Seattle's rates and programs before and after the major system changes that occurred in 1988/1989. It also summarizes the impacts of the changes on tonnage, subscriptions, bills, and recycling.

The second section includes tables of basic information about the unit pricing programs and recycling programs in fifteen communities around the nation.

The third section of the case studies part includes overviews of solid waste systems in fourteen communities around the nation. It addresses background on the city and the solid waste services provided. The discussions then address the topics of collection and rates; recycling; and the status of the jurisdiction's landfill or waste disposal facility.

The case studies present basic information on a variety of systems, including those on both bag/tag systems and variable can subscription systems. These studies may help guide jurisdictions making choices about the appropriateness of particular system designs based on local factors, and the success of particular mixes of system components.

SUMMARY

Decisions on solid waste involve a number of complex questions and issues. The purpose of the manual is to point out the potential benefits of moving toward variable rates. The manual also discusses the potential costs of such a move. There is no doubt that in the short run, a system or rates change involves uncertainty and risk; tradeoffs in a number of areas; and a significant amount of work. However, these are likely to be short-run transition phenomena. In the longer run, the move to a variable rates system and an integrated approach to solid waste management may provide lower system costs, and will allow the jurisdiction to involve the customers in solving, rather than exacerbating, the solid waste crisis.

The tradeoffs and potential savings depend on the configuration of the system that the jurisdiction designs and the local economics. These local factors would presumably be considered by the jurisdiction in determining the ultimate system design. A variety of configurations can work -- but understanding the options available, as well as selecting and implementing the appropriate one for the jurisdiction can be a very intimidating assignment.

This manual and its companion volume are designed to assist both managers and analysts in carrying out an organized, comprehensive, and consistent analysis of the options available in their jurisdiction, and to alert the managers to a broad range of issues, interdependencies, options, suggestions, and solutions.

What has been learned during the research involved in this manual is that there are several keys to developing a successful solid waste management system. These key ingredients include: providing consistent incentives to customers; providing a convenient system with service choices and a variety of legal alternatives for waste management; doing high-quality planning and integrated systems analysis; and providing an integrated system that works together to reinforce solid waste management goals and objectives.

The conclusion reached via this research is that in a vast number of situations and for a number of very good reasons, variable rates make a great deal of sense, especially now. A move to a variable rate system is often considered when recycling programs are introduced, although it is also appropriate to introduce variable rates separately. Variable rates help provide incentives for customers to reduce waste, and can help optimize use of recycling programs. They are feasible, fair, and should be considered seriously, especially by jurisdictions that are:

- o needing to extend the life of current disposal facilities or need to delay siting new facilities;
- o facing legislative mandates for programs or goals,
- o implementing recycling programs,
- o trying to reduce the costs of their disposal systems
- o facing political or public pressure,
- o having difficulties financing the system through non-user fees, or
- o having concerns about environmental issues.

Granted, a comprehensive analysis of the sort described in this document involves a fair amount of work, and there are some jurisdictions for whom a system change does not make financial sense (e.g. jurisdictions with long-term access to environmentally-sound landfill space and who are far from recycling markets). However, it is very likely worth the potential rewards to a great number of jurisdictions.

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