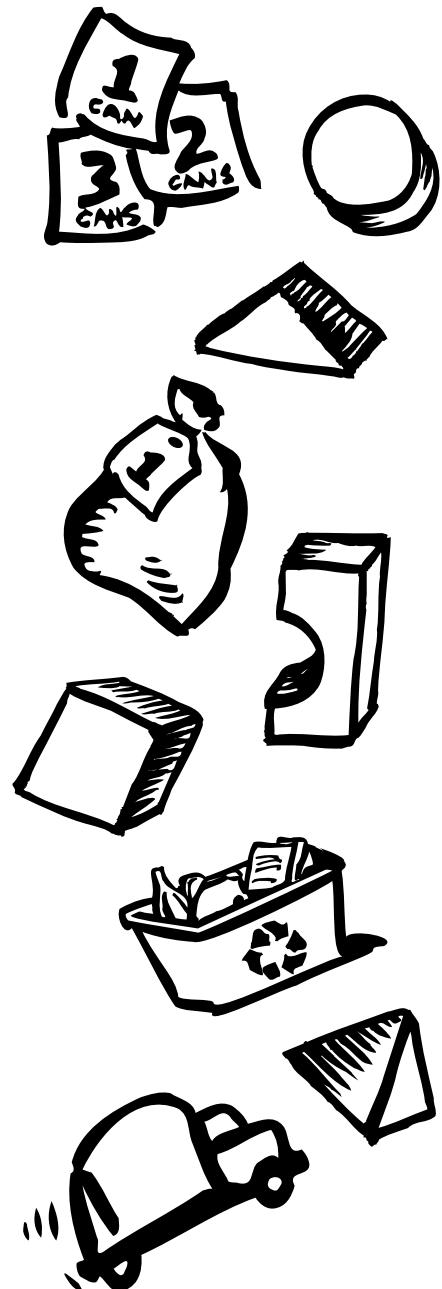


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## Designing an Integrated Unit Pricing Program

To this point, this guide has presented an overview of the major benefits and barriers to unit pricing, followed by suggestions on how to define the objectives of your program and begin building a consensus for unit pricing in your community. This portion of the guide introduces issues relating to the exact structure of your community's unit pricing program. The first half of Part III, "The Building Blocks," discusses the advantages and disadvantages of the specific program components and service options from which you can choose. This is followed by "Putting the Blocks Together," a six-step process to help you design a successful unit pricing program.



## The Building Blocks

While unit pricing is based on the simple concept that households pay only for the waste they generate, designing a working program requires that you consider and decide on a range of specific issues. You may have already examined many of these issues, such as the potential for complementary recycling and composting programs, the types of solid waste services to offer, and the means by which you can provide these services to residents with special needs. During the development of a unit pricing program, however, viewing these issues in the context of how they might affect the success of your program is important.

The process of selecting program components and service options can begin as much as nine months before the start of a program. This part of the guide points out the kinds of decisions you need to make during this process, including:

- Choosing a volume-based or weight-based system
- Selecting containers
- Examining pricing structures
- Considering billing procedures
- Determining service options and complementary programs
- Including multi-family buildings
- Accommodating individuals with special needs

Communities also need to consider other factors, such as the remaining life of existing containers, the cost of container replacements, the preferences of customers, and the impact of assessing additional taxes or fees on households. Later in this section of the guide, a six-step process for designing an actual unit pricing rate structure is presented. This process should help you tailor a rate structure to local conditions.

### Volume-Based Versus Weight-Based Programs

One of the first decisions to be made when designing a unit pricing program is to determine how solid waste will be measured. Based on your unit pricing goals, local budgetary constraints, and other factors, you need to decide whether your system will charge residents for collection services based on the weight or the volume of waste they generate. The two systems have very different design and equipment requirements.

Under **volume-based systems**, residents are charged for waste collection based on the number and size of waste containers that they use. Households are either 1) charged directly for waste collection based on the number of bags or cans set out at the curbside, or 2) required to purchase special trash bags (or tags or stickers for trash bags) that include the cost of waste collection in the purchase price.

Under **weight-based systems**, the municipality weighs at the curbside the waste residents set out for collection and bills for this service per pound. The program can either require residents to use standard, municipally supplied cans or allow them to continue using their own cans. Weight-based systems offer residents a greater waste reduction incentive than volume-based systems since every pound of waste that residents prevent, recycle, or compost results in direct savings. This is true no matter how much or how little waste reduction occurs. In addition, residents can easily understand this type of system and perceive it as fair.

Weight-based systems also provide a more precise measurement of waste generation than volume-based systems.

On the other hand, weight-based systems tend to be more expensive to implement and operate than volume-based systems because special equipment is required and more labor typically is necessary to handle the more complex billing system. In addition, some of the equipment used to weigh the waste, record the data, and bill the customer is still experimental. Startup costs for these systems can include truck-mounted scales for weighing waste and some type of system (such as bar-coding on waste cans) for entering this information into a computer for accurate billing.

While volume-based systems are less costly to set up and operate, a potential disadvantage associated with these systems is that residents might be tempted to compact their waste. Some residents will compact more than others, perhaps even using mechanical compactors. This reduces the ability of unit pricing to offer more equitable charges for waste collection services and complicates the task of identifying the impact of unit pricing on the community's rate of solid waste generation. Additionally, depending on the system chosen, there can be less of an incentive to reduce waste since such reductions might not translate into direct savings for the resident.

Although over 1,000 communities nationwide have unit pricing programs in place, very few have fully implemented weight-based programs. Accordingly, the remainder of this guide focuses predominantly on the process of designing and implementing a volume-based unit pricing program.



*For its weight-based unit pricing program, the city of Farmington, Minnesota, has invested in collection trucks that weigh the waste as it is lifted . . .*



*. . . and record the weight and resident information on an onboard computer for later billing.*



Austin, Texas, provides residents with either 30-, 60-, or 90-gallon cans as part of its unit pricing program.

## Container Options

Communities that decide to design a volume-based unit pricing program must consider the type and size of waste collection containers on which to base their rate structure and billing system. Keep in mind that choices about containers, rate structures, and billing systems all go hand in hand. In some cases, container type will dictate the rate structure and billing system. In other cases, an established billing system (that cannot be drastically overhauled) can govern container type and rate structure.

A unit pricing program can be designed around the following container options:



**Large cans.** Under this system, households are provided with single, large waste cans, often with a capacity of 50 or 60 gallons. Each household is then charged according to the number of cans that they use.



**Small or variable cans.** This system uses a set of standard, graduated can sizes, often ranging from approximately 20 to 60 gallons in capacity. Typically, these systems operate on a subscription basis, under which residents choose in advance the number and size of cans they wish to use.



**Prepaid bags.** This system uses colored or otherwise distinctively marked standard-sized trash bags, typically 20 to 30 gallons in capacity. Residents purchase the bags from the solid waste agency through outlets such as municipal offices and retail stores. Only waste that is placed in the bags is collected.



**Prepaid tags or stickers.** Residents purchase tags or stickers from the solid waste agency and affix them to their own trash bags. The tag or sticker specifies the size of bag it covers.

Each system has its own specific advantages and disadvantages related to such issues as 1) offering a system that residents view as equitable; 2) creating as direct an economic incentive for waste reduction as possible; and 3) assuring revenue stability for the solid waste agency. Other issues to consider when weighing the pros and cons of different container types include simplicity of billing, compatibility with existing waste collection services, ease of collection for work crews, sanitation and aesthetics, budgetary constraints, and community solid waste goals.

The primary benefit of a **single, large container** size is revenue stability. When communities use large containers, the number of cans set out each week tends to remain fairly constant, and so do revenues. The primary disadvantage associated with this container choice is that households that don't generate much waste have no economic incentive

to reduce waste. Such households are billed the same amount whether they fill a 60-gallon can halfway or completely.

Conversely, the principal benefit of using **variable can sizes** is that even modest reductions in waste generation (for example, one less 10-gallon waste container) can clearly translate into savings. A disadvantage of variable cans is that they can be inconvenient for customers who generate large volumes of waste. In addition, to realize savings from reduced waste generation, households must request a change in the number of cans for which they are being billed. The solid waste agency might need to establish an inventory and distribution system that could be expensive to set up and maintain. Additionally, billing for this method can be more complex in some communities.

Like variable cans, **prepaid bags** encourage greater waste reduction than large cans if the bag size is configured so that residents that generate less waste pay less. Additionally, since residents pay for waste collection through the purchase of the bags, there is no billing, which means this type of system is relatively inexpensive to implement and maintain. The primary disadvantage associated with bags is that there is greater revenue uncertainty than with can systems. An individual might, for example, buy several months' worth of bags at one time and then none for many weeks. Also, semiautomatic collection vehicles that require residents to use a rigid container might not be able to adapt to bag collection. Bags also can tear or be torn open by animals, resulting in scattered trash.

**Prepaid tag or sticker** systems offer many of the same advantages as bag systems. Chief among these is that such systems directly encourage waste reduction, since different stickers can be used to identify different amounts of waste "set-outs" (the waste residents set out for collection). This means, however, that the solid waste agency must establish and enforce size limits for each type of sticker. As with bags, waste collection is paid for upfront, so no billing needs to be done. Also like bags, stickers or tags offer less revenue stability. In addition, stickers can fall off in rainy or cold weather, and both tags and stickers can be counterfeited or stolen.

The advantages and disadvantages of each of these container options are described in more detail in Table 3-2 at the end of this chapter. You don't have to be locked into one type of system, however, if you plan for the possibility of change. Some communities conduct a pilot program in one part of the municipality before implementing unit pricing communitywide. In this way, difficulties can be worked out early in the process, when modifications are still relatively easy.



Large, clearly marked tags and stickers will help eliminate confusion and speed curbside waste collection.

While the details of the pricing structures used in unit pricing programs can vary greatly according to local conditions and needs, four basic types are currently in use. These pricing structures are described below.

## Pricing Structures



The main consideration in choosing among the types of pricing structures is their impact on the stability of the community's revenues and on residents' waste reduction efforts. In addition, some pricing systems are more complex than others to administer.

**1. The proportional (linear) rate system** is the simplest rate structure. It entails charging households a flat price for each container of waste they place out for collection. This rate structure provides a strong incentive for customers to reduce waste. It also is easy to administer and bill. Careful consideration is often required, however, to select a price per container that avoids cash flow difficulties that can hinder a new program. While setting too high a price will increase resistance to unit pricing, setting too low a price may cause periodic revenue shortfalls (and can lessen the waste reduction incentive). In addition, when setting rates, decision-makers should assume that some level of waste compaction will occur. They also should plan for success, since as people begin to reduce the amount of waste they set out, the solid waste agency will see a corresponding drop in revenues paid for waste collection.

### Weighing the Tradeoffs When Setting Pricing Structures

Decision-makers considering such issues as container choices, rate structures, and service options quickly realize that all of these choices are closely related. Decisions in one area will influence, or even determine, how your community responds to the remaining choices.

When considering container options, for example, a smaller community with fewer resources might favor a bag-based system because of its generally lower implementation and administrative expenses. Such systems, however, have the potential for revenue gaps that the community might not be able to bridge. As a result, a community might prefer a two-tiered or multi-tiered rate structure, whose base fee would help prevent such instability.

By contrast, a larger community interested in providing a stronger incentive to reduce waste might favor a proportional or variable container rate and higher per container fees. To avoid significant revenue fluctuations, such communities might choose a can-based subscription system that ensures a steady cash flow.

There is no one best approach to unit pricing. Throughout the design process, you will need to determine the specific combination of container choices, rate structures, and service options that will maximize efficiency and enable your community to meet its solid waste goals.

**2.** With a **variable container rate**, a different rate is charged for different size containers. For example, a solid waste agency might charge households \$2 for every 60-gallon can of waste set out and \$1.25 for every 30-gallon can. While this system creates a strong incentive for residents to reduce waste, it requires that communities carefully set their rates to ensure revenue stability. Because different rates are charged, this system can be complicated to administer and bill.

**3.** Both of these systems use a per-container fee to cover the fixed and variable costs associated with a community's MSW management. Other unit pricing rate structures address fixed and variable costs separately. **Two-tiered rate systems** assess households both a fixed fee and a per container fee. Under this system, a monthly flat fee is set for solid waste services to ensure that fixed costs are covered; a separate, per-container charge is then used to cover the variable costs. In Pennsbury, Pennsylvania, the solid waste agency charges residents a flat \$65 per year plus \$1 per 30-gallon bag of waste placed at the curb for pickup. This system provides more stable revenue flows for the community but offers less waste reduction incentives than proportional or variable container rates. Some communities use the two-tiered rate structure as a transition system. Once decision-makers are able to gauge customers' response to unit pricing, a proportional rate structure could be introduced to encourage greater waste reduction.

**4.** **Multi-tiered rate systems** charge households a fixed fee plus variable fees for different container sizes. For example, a community might charge a basic \$10 monthly service fee plus \$2 per 60-gallon can, or \$1 per 30-gallon bag. This rate structure offers similar advantages to two-tiered rates and also encourage waste reduction. This type of rate structure is the most complex, however, and could be difficult to administer and bill.

**Table 3.1.**  
**Pricing Options**

System	Rate
Proportional (linear)	Flat rate per container
Variable container	Different rates for different size containers
Two-tiered	Flat fee (usually charged on a monthly basis) and flat rate per container
Multi-tiered	Flat fee (usually charged on a monthly basis) and different rates for different size containers

## Billing and Payment Systems

Traditional solid waste programs typically assess households a fixed fee, raised through property taxes or periodic equal billing of all households. Unit pricing programs use various billing/payment systems, such as direct payment for containers, actual set-outs, and payment for advance subscriptions.

With a **direct payment system**, residents pay for solid waste services by purchasing bags or tags from the solid waste agency. Containers can be sold at the courthouse or city hall, at local retail stores, or at the hauler's office. Care should be taken to ensure that a sufficient number of easily accessible outlets are available for residents.

Under **subscription systems**, residents notify the solid waste agency of their "subscription level," or the number of containers they anticipate setting out each collection cycle. The customer is then billed on a regular basis for these containers. If customers are able to reduce the amount of waste they generate, they can select a lower subscription level and save money. In many programs, these subscription fees are set at a level that covers the purchase of a designated number of additional bags or cans for any waste that a customer disposes of above their subscription level. This system offers fewer fluctuations in revenues, although the waste reduction incentive is lower because residents who reduce their waste generation rate only receive a reduction in their waste collection bill after requesting the municipality to change the number of cans for which they pay.

An **actual set-out system** bills customers based on the actual number of containers set out for collection. This approach requires the hauler to count the number of bags, tags, or cans set out and to record the information so that households can be billed later.

To address citizens' concerns about "hidden" or "double" fees, some communities that implement unit pricing either reduce the household tax rate commensurate with the unit pricing fee or decide not to raise the tax base proportionately with the revenues received from unit pricing. Meet with the citizens advisory council to work out the details for a pricing system geared to your local needs and circumstances.

## Accounting Options

Regardless of how they collect payment, most communities tend to manage the finances of their solid waste activities as one item in the municipal budget. A few communities, however, are using alternative accounting approaches to complement their unit pricing programs. One such approach is the use of "full cost accounting." Using full cost accounting enables a community to consider all costs and revenues associated with a task such as solid waste management, including depreciation of capital costs, amortization of future costs, and a full accounting of indirect costs. This method can help a community



establish a unit pricing rate structure that will generate the revenues needed to cover all solid waste management costs.

Another approach that can be used in conjunction with a unit pricing program is the development of an “enterprise fund.” Also referred to as special districts, enterprise funds are entities that can be used to separately manage the finances of a municipality’s solid waste activities. In this way, the costs and revenues of unit pricing are accounted for under a separate budget, enabling a community to better anticipate revenue shortfalls and, when appropriate, invest surplus revenues in beneficial waste management projects that can reduce the cost of MSW management in the future.

## Program Service Options

The next step is to determine which solid waste services are most important to residents. Successful programs offer an array of solid waste services that citizens need and appreciate. The goal-setting process described in Part II of this guide identifies many of these services.

Offering different services does add layers of complexity to a unit pricing program, especially to the billing component. Yet providing such service enhancements greatly increases overall citizen acceptance of the program. A carefully selected and priced service array allows a community to offer premium municipal solid waste services to households that want them, while generating sufficient revenues to support core solid waste collection services. The following sections highlight some of the most popular service options, many of which are complementary to basic trash removal.



### Complementary Programs

Complementary programs are those that enhance the unit pricing program and encourage residents to prevent and reduce waste. The most common complementary programs are 1) recycling and 2) collection of yard trimmings for composting. Providing recycling and composting collection services enables both types of programs to reach their maximum effectiveness. In fact, in many cases, recycling and composting are major contributors to the success of a unit pricing program.

Many communities already have some type of curbside collection or voluntary drop-off recycling program in place. Linking recycling and composting with unit pricing provides customers with an environmentally responsible way to manage their waste. In addition, since the cost of these programs can be built in to unit pricing fees, communities can recover these expenses without creating an economic disincentive to recycle. The extent of the recycling program is an important factor, as



*Providing a recycling program in conjunction with unit pricing can further decrease the amount of waste your community must dispose of.*



Complementary programs also can benefit from a strong public education effort.



well. A community will more fully realize the benefits of offering recycling in tandem with unit pricing if the recycling program is geared to collect a wide range of materials (although the availability of local markets can constrain the types of materials a community can accept).

Providing for removal of yard trimmings such as leaves, branches, prunings, and grass clippings, and promoting backyard composting and “grasscycling” (leaving grass trimmings on the lawn), also will enhance the unit pricing program. For example, the community of Austin, Texas, mixes the yard trimmings it collects from residents with sewage sludge to produce compost called “Dillo Dirt,” which is sold to nurseries as fertilizer, and Durham, North Carolina, makes landscaping mulch from brush. Distributing “how-to” materials can help increase the amount of organic waste residents compost, and some municipalities even provide their residents with free compost bins.

In communities where weekly recycling or composting is too costly, curbside collection can be scheduled every other week or once a month. In addition, municipalities can encourage haulers to provide recycling services by including a risk-sharing clause in their contracts. Such clauses require the municipality to share with the hauler the risk of fluctuations in the price of recyclable materials. If a recycling company requires payment to process a certain collected material whose value had dropped substantially, for example, the hauler and municipality would bear these costs together. Some communities, however, might not feel their budget would allow them to incur additional, unexpected costs.

### Backyard Collections

Backyard collection of waste and/or recyclables can be considered as a service enhancement that complements a unit pricing system. With this service, haulers remove residential waste and recyclables from backyards, garages, or wherever residents prefer, rather than requiring them to haul the material to the curb. Residents might pay extra for this service. When setting a price for backyard collection services, a community should consider costs to collect waste from the curb, transport it, and dispose of it. The higher charge for backyard waste removal should reflect the added municipal resources required for such a service.

### Curbside Collection of Bulky Items

Curbside collection of large items, such as refrigerators and other major appliances, is another service that complements basic trash removal. In some communities with unit pricing, residents pay extra to

have bulky items picked up and disposed of by the municipality. The disposal of bulky items, which cannot fit into most unit-pricing programs' cans or bags, can be charged for within a unit pricing system by using printed stickers or tags that are attached to the item. To establish fair prices, the solid waste agency can use the same collection, transportation, and disposal cost considerations that apply to establishing prices for standard unit pricing waste collections. The price could be set in advance of collection, based on the owner's description of the item, or after collection, based on the collection agency's observations.

## Multi-Family Housing

One of the biggest challenges for communities implementing unit pricing is how to include multi-family (five units or more) residential structures into the program. Such buildings can house a large portion of the population, particularly in densely populated areas. Because waste often is collected from residents of such structures per building, rather than per unit, it might be difficult to offer these residents a direct economic incentive to reduce waste with unit pricing. To compound this problem, because many multi-family buildings receive less convenient recycling services than single-family housing units, residents of multi-family buildings might have fewer avenues for waste reduction.



BARRIERS

There are several possible options to resolve multi-family barriers. One option is to have the building manager sell bags or tags to each resident. When households use these tags or bags, those that generate more waste end up paying more for waste collection. Problems arise

### *Tips for Accommodating Residents of Multi-Family Households*

A number of ideas were presented at EPA's Unit Pricing Roundtable to help extend to residents of multi-family households the direct economic incentives inherent in unit pricing. One suggestion was to request that building managers pass on trash collection savings to residents in the form of cash rebates, rent reductions, or some free building services, although the impact of the incentive would be diluted since it is spread over all the tenants in the building.

New technologies, such as a bar code reader to identify the tenant and a scale at the bottom of the chute to record the weight, also were suggested as possible solutions. These technologies offer the potential for accurately recording the exact waste generation for each tenant.

In addition, building codes for new and renovated buildings could be amended to require the installation of separate chutes for recycling and for garbage disposal. Residents also could be required to use a trash token or some type of identifying code to gain access to a garbage chute.

when households do not comply with this system, however. In many cases, residents can easily place waste in the building dumpster without paying for a bag or sticker. Another approach is to modify the system of placing waste out for collection in multi-family buildings. For example, dumpsters or garbage chutes could be modified to operate only when a magnetic card or other proof of payment is used. Such modifications can be expensive, though. Communities with unit pricing systems in place are experimenting with other possible solutions to the multi-family barrier. If extending unit pricing service to multi-family buildings is a concern in your community, consider contacting other cities or towns that have addressed this issue for additional ideas. (A listing of these communities is provided in Table 3-2 at the back of this section.)

## Residents With Special Needs

Many communities considering unit pricing are concerned about the special needs of physically limited or disabled citizens and those living on fixed or low incomes. For example, some senior citizens and disabled residents may be physically unable to move trash containers to the curb. Communities may wish to consider offering such residents backyard collection services at a reduced rate or at no extra charge. Such special considerations should be factored in to your unit pricing rate structure.

While the fees associated with unit pricing could represent a potential problem for some residents, unit pricing systems can be structured to allow everyone to benefit. To provide assistance to residents with special financial needs, communities can reduce the per-household waste collection charges by a set amount, offer a percentage discount, or provide a credit on the overall bill. In some cases, communities with unit pricing programs offer a certain number of free bags or stickers to low-income residents. Some communities charge everyone equally for bags or tags but reduce the base service charge for low-income households. Assistance also can be offered through existing low-income programs, particularly other utility assistance efforts.



*In some communities, backyard collection can be arranged as a service for disabled or elderly residents.*

waste services by practicing source reduction, recycling, and composting. Communities will need to determine how to identify the amount of assistance they will offer based primarily on the program's anticipated revenues. As a basis for establishing eligibility for assistance, some communities with unit pricing programs use income criteria such as federal poverty guidelines.

**Table 3-2.****Advantages and Disadvantages of Unit Pricing Container Systems****Can Systems**

<b>Advantages</b>	<b>Disadvantages</b>	<b>Communities Using This System</b>
Revenues are fairly stable and easy to forecast.	Cans often have higher implementation costs, including the purchase and distribution of new cans.	Hennepin County, MN
Unlike bags, cans often work well with semiautomated or automated collection equipment (if cans are chosen that are compatible with this equipment).	Customers have a limited incentive to reduce waste. Since residents are usually charged on a subscription basis, there is no incentive not to fill cans already purchased. In addition, no savings are possible below the smallest size trash can.	Seattle, WA
If residents already own trash cans of roughly uniform volume, new cans might not be required.	Relatively complex billing systems are needed to track residents' selected subscription level and bill accordingly.	Anaheim, CA
Cans may be labeled with addresses to assist in enforcement.	Complex storage, inventory, and distribution systems are required to provide new cans to households that change their subscription level.	King County, WA (in unincorporated areas)
Cans prevent animals from scattering the waste.	A method of collecting and charging for waste beyond subscription levels and for bulk waste collections needs to be established.	Marion County, OR
	At the outset, residents may find it difficult or confusing to select a subscription level.	Pasadena, CA
	Nonautomated can collections tend to require greater time and effort than collecting waste in bags.	Glendale, CA
		Oakland, CA
		Bellevue, WA
		Santa Monica, CA
		Duluth, MN
		Richmond, CA
		Walnut Creek, CA
		Santa Clara, CA
		Auburn, WA
		Hastings, MN

**Table 3-2 (continued).**  
**Advantages and Disadvantages of Unit Pricing Container Systems**

Advantages	Disadvantages	Communities Using This System
Residents find bag systems easy to understand.	Greater revenue uncertainty than with can-based systems, since the number of bags residents purchase can fluctuate significantly.	Grand Rapids, MI
Bag systems might offer a stronger waste reduction incentive than can systems because fees typically are based on smaller increments of waste.	If bags are sold in municipal offices, extra staff time will need to be committed.	Reading, PA
Accounting costs are lower than with can systems, since no billing system is needed.	Residents might view a requirement to buy and store bags as an inconvenience.	Lansing, MI
Bag systems have lower distribution, storage, and inventory costs than can systems when bags are sold at local retail establishments and municipal offices.	Bags are more expensive than tags or stickers.	St. Cloud, MN
Bag collections tend to be faster and more efficient than nonautomated can collections.	Bags often are incompatible with automated or semiautomated collection equipment.	Darien, IL
Bags can be used to indicate that the proper fees have been paid for bulky items or white goods, since fees for pickup of these items (above the subscription level) often are assessed by communities. Communities can ask residents to attach a certain number of bags to the items according to the cost of disposal (for example, two bags for a couch and three bags for a washing machine).	Animals can tear bags and scatter trash, or bags can tear during lifting.	Carlisle, PA
	Unlike cans, bags are not reused, adding to the amount of solid waste entering the waste stream.	Quincy, IL
		Oregon, WI
		Fallbrook, CA

**Table 3-2 (continued).**  
**Advantages and Disadvantages of Unit Pricing Container Systems**

<b>Advantages</b>	<b>Disadvantages</b>	<b>Communities Using This System</b>
Tag and sticker systems are easier and less expensive to implement than can systems.	There is greater revenue uncertainty than with can-based systems, since the number of tags or stickers residents purchase can fluctuate significantly.	Tompkins County, NY
Residents often find tag or sticker systems easier to understand.	To avoid confusion among residents, the municipality must establish and clearly communicate the size limits allowable for each sticker.	Aurora, IL
These systems offer a stronger waste reduction incentive than can systems because fees are based on smaller increments of waste.	If tags or stickers are sold in municipal offices, extra staff time will need to be committed.	Grand Rapids, MI
Accounting costs are lower than with can systems, since no billing system is needed.	Residents might view a requirement to buy and store stickers or tags as an inconvenience.	Lansing, MI
Selling tags or stickers at local retail establishments and municipal offices offers lower distribution, storage, and inventory costs than can systems.	Tags and stickers often do not adhere in rainy or cold weather.	
The cost of producing tags or stickers for sale to residents is lower than for bags.	Extra time might be needed at curb for collectors to enforce size limits. In addition, there may be no incentive for strict enforcement if haulers are paid based on the amount of waste collected.	
Stickers can be used to indicate payment for bulky items or white goods, since fees for pickup of these items (above the subscription level) often are assessed by communities.	Stickers left on trash at curbside could be removed by vandals or by other residents hoping to avoid paying for waste services.	
	Tags and stickers are not as noticeable as bags or other prepaid indicators.	

## Tag or Sticker Systems

## Putting the Blocks Together

*Now that you have identified the components of unit pricing programs in general, you are ready to design a program that meets your community's specific needs and goals. "Putting the Blocks Together" presents a six-step process that can assist you in designing and evaluating your preliminary rate structure. This process should begin approximately six months before the start of your program.*

### Performing the Six-Step Process...

As you are completing these steps, be sure to keep a few basic objectives in mind:

- Raise sufficient revenues to cover fixed costs and variable costs.
- Possibly raise revenues beyond the cost of the program to cover other waste management costs. These revenues might be used for antilittering campaigns or to discourage illegal dumping.
- Send clear price signals to citizens to encourage waste reduction.
- Charge appropriate fees to cover the costs of 1) recycling and other complementary programs, 2) providing services (such as backyard collection) for physically limited or disabled people, and 3) any discount pricing provided to low-income households.
- Compile accurate MSW baseline data to be used when evaluating your unit pricing program.
- Design a program simple enough to keep administrative costs low and to make it easy for people to participate in the program, thereby reducing both their waste generation and their waste collection bill.
- Also, don't forget to consider your unit pricing goals, community-specific conditions, and the most promising suggestions from municipalities with existing unit pricing programs to ensure a program tailored to the waste management needs and concerns of your community.

# 1

STEP

## Demand: Estimate Total Amount of Waste Generated in the “Steady-State”

Because the amount of waste your community generates affects the level of resources (including trucks, labor, and administrative support) required to manage it, you need to accurately estimate what the community’s waste generation rate will be after your unit pricing program is fully established. This period is referred to as the “steady-state.” In the steady-state, residents have accepted unit pricing and reduced their waste generation rates accordingly, and the municipality’s waste management operations have adjusted to new, lower waste collection requirements.



Ensuring that the revenues received under the unit pricing program will cover the program’s costs is a critical factor for most communities. As a result, accurately estimating the amount of waste collected in the steady-state is an important first step in determining how much money unit pricing will actually generate. To develop such an estimate, perform the following calculations:

- ▶ **Current demand.** Using your waste hauling records, estimate the amount of waste collected from residents last year.
- ▶ **Community growth.** Next, estimate the population growth trends and other demographic patterns in your community. Use this information to estimate the demand for waste management services over the next one or two years. This information can be developed in several ways; the box entitled “Forecasting Community Growth Trends” on page 31 discusses some different approaches. (Note: If you are planning special programs for low-income, elderly, or multi-family households, you should estimate the population trends of these residents or households as well.)
- ▶ **Impact of unit pricing.** Then, estimate the likely impact (i.e., household responsiveness) of unit pricing on this demand for waste services. Other communities with unit pricing programs in place might be a good source of information on the degree of waste generation reduction to be expected. Some communities have achieved 25 to 45 percent reductions in waste generation rates, depending on such factors as the use of complementary programs, the design of the unit pricing rate structure, and the effectiveness of the public education effort. Be sure not to underestimate the potential success of your unit pricing program, especially if strong public education and complementary programs are planned. Underestimating waste reduction will cause you to overestimate potential revenues.

Use this information on current demand, community growth, and the impact of unit pricing to estimate the total amount of solid waste you expect will be generated once the unit pricing program has been established.

## Forecasting Community Growth Trends

Forecasting trends in the growth of a community's population is an important step in accurately estimating the amount of waste generated under an ongoing unit pricing program. Typically, the degree of sophistication a community brings to this process will vary with the information and resources available.

For example, if your community is small and you expect no change in population trends, per capita waste generation, and commercial or industrial growth, you could use a simple trend analysis to forecast growth. Your estimation of current waste generation amounts might be based on a waste characterization assessment, historical records from collection services and disposal facilities, or estimates based on similar communities' analyses. Extending these trends can provide an estimate of future demand for solid waste services. If you base your estimates on other communities' analyses, be sure to choose communities that are similar to yours in size, population, income distribution, urban/rural distribution, and economic base. In addition, using the most recent analyses available will increase the accuracy of your estimation.

In contrast, if your community is large and you expect a change in current trends, you probably will need to use a sophisticated forecasting equation that will account for all the variables you identify. Your solid waste agency may have collected data on a number of factors that previously have influenced the amount of waste generated by the community (such as housing construction, plant closings, household income, economic growth, and age distribution of the population). You could base projections of future demand for solid waste services by introducing these data into your

2  
STEP

## Services: Determine the Components of Your Unit Pricing Program

After clarifying your community's goals and considering the pros and cons of the unit pricing program options described earlier in this section of the guide, you will be ready to determine the methods your solid waste agency will use to collect waste from residents and other details of your unit pricing program, including:

- **Containers.** After considering their practical implications, decide whether your unit pricing program would be most effective using cans, bags, tags or stickers, or some type of hybrid system. Determine the volume of the containers to be used.
- **Service Options.** While most unit pricing programs will include curbside collections, decide whether your program would benefit from such additional services as backyard collections and picking up bulky items such as white goods.

- ▶ **Complementary waste management programs.** If your community is not already operating programs like recycling or composting, consider whether you might implement them to enhance the effectiveness of your unit pricing program and to help meet other community goals.
- ▶ **Residents of multi-family buildings and low-income residents.** Determine how your community plans to extend the economic benefits of unit pricing to residents of multi-family buildings and deal with the needs of low-income residents and the elderly.

## 3 STEP

### Costs: Estimate the Costs of Your Unit Pricing Program

Having determined the structure of your program and the services to include, list all associated costs. Categories of costs can include:

- ▶ **Start-up costs.** Estimate the one-time costs your community will incur when implementing the unit pricing program, such as training personnel, purchasing new containers, and designing and implementing a new billing process.
- ▶ **Ongoing costs.** Estimate the costs your program will incur on an ongoing basis. These costs include variable costs (such as landfill tipping fees) and more stable or fixed costs (including rent and utilities for agency offices and office supplies) that remain relatively constant despite fluctuations in the amount of waste collected. Be sure to consider any extra costs from providing special services to certain groups. (Some communities might find it useful to employ full cost accounting procedures to better understand the exact costs of the different projects planned as part of the unit pricing program.)

## 4 STEP

### Rates: Develop a Tentative Unit Pricing Rate Structure

Having determined the components of your program, you can now set a tentative rate structure. At this point, the rates should be considered merely rough estimates to be revised and refined in light of the overall revenues they will generate and how acceptable the costs will be to residents. The rates you start with can be borrowed from the figures used by neighboring unit pricing communities offering similar services or adapted from price ranges found nationally. As you work through the remaining steps in the process of setting a rate structure, you can determine whether the rates are appropriate and make adjustments accordingly. Be sure to specify any lower rates that you plan to make available to some portions of your community (such as discounts for low-income households).

# 5

STEP

## Revenues: Calculate the Revenues From Unit Pricing

You now have the information needed to estimate the revenues that your unit pricing program will generate once it has been established and residents have adjusted their waste generation rates accordingly. Divide the total amount of waste generated per month in the steady-state (estimated in Step 1) by the volume of containers, such as bags or cans, you established in Step 2. This provides an estimate of the number of containers of solid waste you expect to collect per month. Then multiply the estimated number of containers by the unit charge you have tentatively established in Step 4. This yields an estimate of the total revenues per month generated under unit pricing.

Depending on the number of services offered and the unit pricing structure itself, these calculations can be simple or complex! For example, communities using cans of varying sizes and offering additional services (such as backyard waste collection) must estimate the revenues produced by each component of their solid waste program. In addition, if low-income households are subsidized under your program, be sure to calculate the size of the subsidies and subtract from the expected revenues.

# 6

STEP

## Balance: Evaluate and Adjust Your Preliminary Unit Pricing Program

For most communities, comparing the anticipated costs of their unit pricing program (Step 3) against expected revenues (Step 5) will provide the critical indication of whether the program is viable. (It is important in this step to be able to rely on accurate baseline data for gauging the viability of your program.) If this comparison indicates that the costs of your unit pricing program might not be fully covered by its revenues, you need to review both the design of the program (Step 2) and the rates you plan to charge (Step 4). Several revisions of program options and rate structures may be required to achieve a unit pricing program that most closely meets the goals established by the community in the planning phase (see Part II).

Once you feel that your program strikes a working balance between costs incurred for services provided and the prices residents will be charged, it might be appropriate to submit the program design to other municipal officials or community leaders for additional input. This process of review and comment can continue until a balanced program agreed upon by community representatives has been established.

## The Six Steps in Action: Designing a Rate Structure for Community A

To illustrate the steps in action, we will follow Community A, a hypothetical town, as it designs a rate structure for its new unit pricing program based on its own particular goals and concerns.

**Estimating waste generation rates.** Community A's records show that it collected 480,000 cubic yards of solid waste from its residents last year. Municipal officials realize that the population of the town is likely to increase next year after a large multi-use building complex is completed. Based on population projections prepared by town planners, officials estimate that, at the current rate, residents will generate nearly 600,000 cubic yards of solid waste annually two years from now. Within this two-year period, however, officials hope their unit pricing program will have reached its steady-state and residents will be generating less waste. Using data from three nearby, demographically similar towns that have established unit pricing programs, municipal officials estimate that two years after implementation of the unit pricing program the community will generate about 410,000 cubic yards of waste annually.

**Establishing rates.** At this stage in the design process, municipal officials in Community A decide to use the median rate of the prices charged by other communities across the country (\$1.75 per 30-gallon bag). In addition, this rate is very close to the price adopted by the three nearby unit pricing communities for their 30-gallon containers.

**Calculating revenues.** Dividing the annual amount of solid waste Community A expects to generate in the steady-state (410,000 cubic yards) by the size of their waste container (30 gallons or 0.15 cubic yards) shows that the municipality can expect to collect over 2,733,000 bags each year. By multiplying this figure by the price per bag (\$1.75), officials calculated that Community A should receive about \$4,780,000 in revenues from its unit pricing program each year.

**Calculating costs.** Community A estimates that the annual steady-state cost of its program will include approximately \$1,000,000 in fixed costs, such as public education efforts, computers and other office materials, and enforcement efforts, and approximately \$2,700,000 in tipping fees and other variable costs. Combining these figures produces an annual steady-state cost of approximately \$3,700,000 for the program. Additional start-up expenses also would be incurred.

**Comparing costs and revenues.** While recognizing that their program must cover the town's waste management costs completely, officials in Community A agreed the town should cover any start-up costs that exceeded revenues during the initial transition period. Therefore, when a comparison of the expected revenues against the costs of the unit pricing program showed that the program would generate excess revenues, municipal officials decided to lower the price charged per bag to \$1.35. This new price would yield a projected \$3,690,000 annually, closer to the town's actual costs of maintaining the program.

## Balancing Costs and Revenues



### Costs

A community can select from an impressive array of service options when mapping out a unit pricing program. After estimating the demand for services in STEP 1, communities can plan for the services they will offer in STEP 2. Some communities will want to offer services such as backyard collections, comprehensive recycling programs, and assistance to residents with special needs. Bear in mind, however, that while these projects can help promote source reduction and increase citizen enthusiasm, they also can increase the cost of your program significantly. Use STEP 3 to help estimate the costs of the services you are planning to offer.

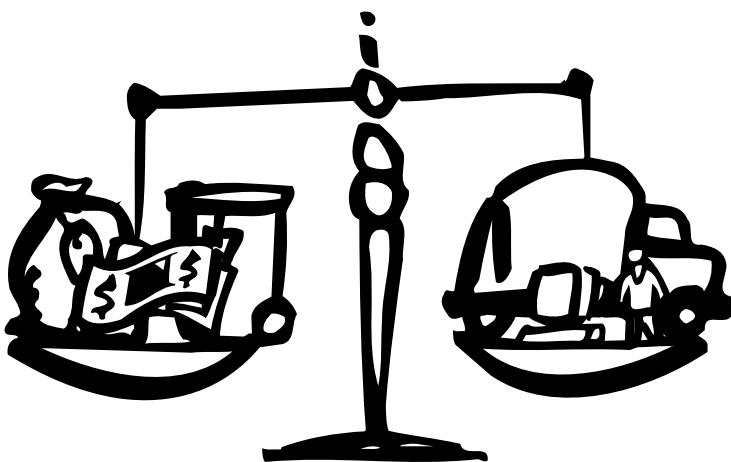


### Revenues

The flip side of costs is revenues. Unit pricing allows communities to generate the revenues needed to pay for solid waste management services under the new program. In fact, when developing a rate structure in STEP 4 and calculating the resulting revenues in STEP 5, communities might decide to set prices at a level above the cost of their unit pricing program. This would further encourage source reduction among residents and ensure that revenues could cover any shortfalls. Since residents will only support a program they feel charges a fair price for solid waste services, however, there are limits to this strategy.

### Balance

To be successful over the long term, your unit pricing program will need to carefully balance the services you want to include against the revenues that residents provide. The exact formula will depend upon local conditions. Use STEP 6 to help you compare the costs of your planned program against anticipated revenues. Keep revising your rate structure until you feel that you have a program that offers the services you need at a price residents can support.



# questions & answers

## How small should our smallest can or bag be?

Unit pricing communities agree that planning for success is important during the design process. Some communities have found that cans as small as 10 to 20 gallons are needed! For example, Olympia, Washington, offers residents a 10-gallon can and Victoria, British Columbia, uses a 22-gallon can as the base service level. A number of communities using large containers (such as 60-gallon cans) are finding that these containers are too large to offer customers meaningful incentives, but purchasing and delivering new, smaller cans later in the program is very expensive. In the short run, a broader range of service can be provided by using several smaller cans. This also helps keep the system flexible for future changes.

## What pricing rates are communities charging?

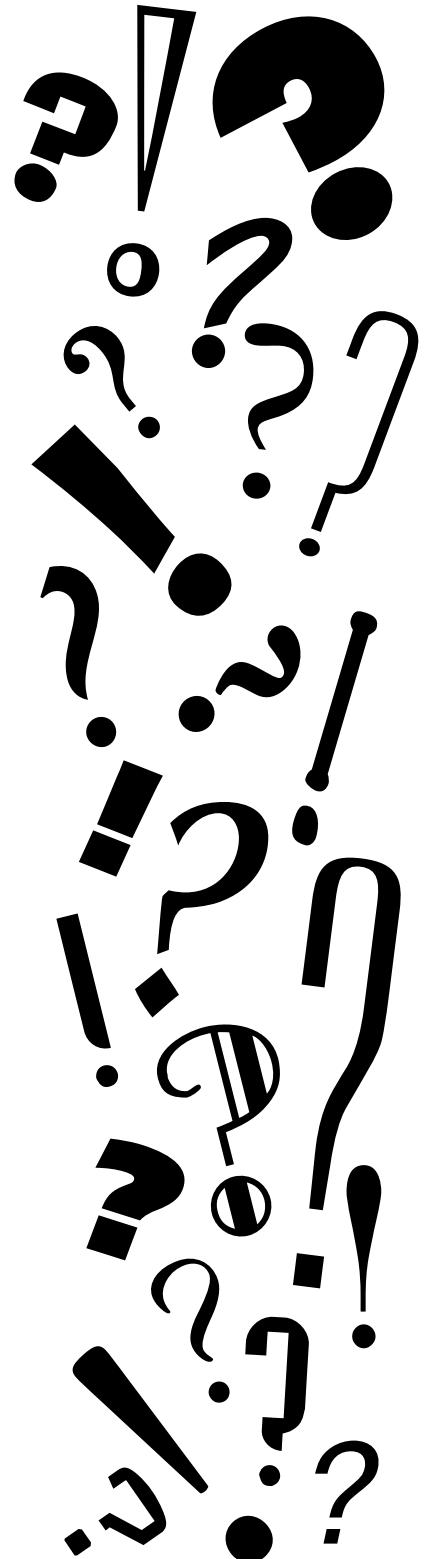
For bag systems in the Midwest and Pennsylvania, communities charge about \$1 to \$2 per 30-gallon bag. For variable can programs in the Northwest and California, towns charge \$9 to \$15 for the first level of service (20 to 40 gallons), with charges for additional cans of service ranging from 30¢ to \$15.

## We have an existing variable rate can program. How can we increase the incentive for waste reduction?

The key change to make is to base your billing on actual set-outs rather than using a subscription approach. Offer smaller cans to encourage waste reduction, and consider a bag-based system. Upgrading composting and recycling options (including plastics collection, for example, if you don't already) also will provide an incentive for customers to reduce waste. Communities also universally state that education is critical to helping customers understand and work with the system. Finally, consider a weight-based program. You might find that the cost of implementing this type of program is not prohibitive and that it can work in tandem with your existing cans.

## How can we improve source separation of recyclable materials?

Some residents may tend to be sloppy about source separation regardless of the type of solid waste pricing system. As people learn to reduce their costs by recycling more, however, they may become more inclined to introduce nonrecyclables in their recycling bins. Many communities have found the best solution is a good education and enforcement program that creates a sense of ownership among residents, supported by peer pressure against such behavior. Some also impose a small charge for recyclable materials in their rate structure design.



# Points to remember



Remember that container options, complementary programs, rate structures, and billing systems are all **interrelated**. As you consider the different options, keep in mind the need to cover costs, keep the system simple and convenient, encourage waste reduction, and minimize administrative burdens on your agency.



Tradeoffs must be considered as you make decisions about rate structures and program options. **Balance**, for example, the need to generate revenues against providing incentives for waste reduction.



Consider **complementary programs**, such as recycling and collection of yard trimmings, to increase the effectiveness of unit pricing.



Consider how to ensure that unit pricing's economic incentives to reduce waste can be extended to residents of multi-family housing in your community.



Design your program to be flexible enough to allow for groups with **special needs**. Discount pricing or assistance programs might be necessary to ensure that the program encourages waste reduction without imposing physical or financial burdens on handicapped or low-income members of your community.



Refer back to your **unit pricing goals** when making rate structure decisions. While information from other communities with unit pricing programs is helpful, your own community's solid waste concerns should be the overriding factor.

# Case Studies

## Establishing a Rate Structure A View From Seattle

**Unit pricing structure.** Seattle has established a two-tiered, variable subscription can unit pricing program. To ensure support for the program from our City Council and residents in general, we needed to design a program that keeps rates low and revenues stable. To accomplish this, Seattle chose to adopt a two-tiered rate structure. The mandatory base charge (called a minimum charge) is \$5.85 a month. We also charge \$15 for each standard size (30-gallon) can per week. The Council pushed for this structure, believing it would keep overall rates down and send a strong environmental message to the community at the same time. There tends to be broad support for the single price per can.

We also have introduced smaller can sizes. About 30 percent of our customers use minicans (19-gallon capacity), which cost \$11.50 per week, and we soon will be providing microcan service (a 10-gallon container) for \$9.35 per week. After talking with customers and observing their waste disposal habits, we found a lot of customers could fit their waste into a micro can. We expect about 10 percent of all customers to use the micro cans.

**Complementary services.** After electing to collect yard trimmings as part of our program, we decided to set a flat fee of \$3 per household per month for this service, believing that a more complicated system would only make the program's administration prohibitively costly. We offer bulky item pick-up for \$25 per item. The price was set to cover hauling and administrative costs.

For waste that is generated above the subscription level, residents must attach a trash tag, marketed through local retail outlets, to garbage bags. The trash tag system has been one of our less successful programs, partly because customers just don't know about it. In addition, our haulers do not always enforce the tag system. Since they get paid per ton of waste they pick up, they have no incentive to leave the waste at the curb. We estimate we forfeit anywhere from \$500,000 to \$1 million dollars a year on fees not paid on this additional waste.



## Tags and Stickers A View From Illinois

One of the major advantages of tags and stickers is that, since residents pay for them at various outlets in the community, there is no billing at all. They also are applicable to different types of services, containers, and waste, and they are easy to purchase and hold on to until needed. Multiple tags or stickers can be used on bulky waste items, too.

Tags and stickers also are easy for collection personnel to use. Since every second they spend at a stop costs money, the more data collection or enforcement that a community

requires haulers to perform per stop, the less likely they are to do it. In addition, the tags and stickers are still useful even in cases where collection personnel can't read or write.

But tags and stickers are not perfect. The hauler might not be able to find them. People can steal them off other residents' garbage bags and put them on their own bags. A special problem for stickers is that they can fall off in rainy or cold weather. Furthermore, people may buy a large number of tags in January, and then none for the next several months. Not only does this create an uncertain revenue supply, it also makes predicting solid waste volume very difficult.



## Experience With Weight-Based Systems *A View From Farmington, Minnesota, and Seattle, Washington*

In **Farmington, Minnesota**, we worked for two years to develop and implement a weight-based unit pricing program for our town of 5,000 residents. Our new system uses fully automated trucks that require just one person per truck to hoist and weigh the garbage can. The truck's weighing system reads a bar code on the can that identifies the resident's name and address. The truck then empties the can and the information is fed automatically into the billing system through an onboard computer. This provides a reliable system for charging residents for waste collection by weight.

One issue we have to resolve is establishing an appropriate regulation for the weighing mechanism used in our system. After Minnesota's Weights and Measures Agency decided it did not have the authority to verify the scales on the trucks, the state legislature adopted standardized weight and measure legislation establishing regulations covering weighing equipment for garbage collection trucks. One issue that remains, however, is that the degree of calibration required is too precise (the same as that for grocery store scales). We are now in the process of petitioning for changes to make the regulation more consistent with practical needs.

In **Seattle, Washington**, we tested two different weight-based systems: a hand-dumped weight-based system and a semi-automated weight-based system. The hand dump system, designed around a "hook scale" and a bar code, was tested over the course of three months. The collector hung the can on the hook and used a scanner on the bar code. The weight and number were recorded in a portable calculator-sized computer and downloaded to a personal computer for calculating and mailing mock bills to customers. The second system we tested during a six-week trial used a retrofitted semiautomated tipping arm and a radio-frequency tag. The weight and customer identification number were automatically recorded during the dumping cycle. Both approaches worked extremely well. The first system took about 10 percent longer for collection; the second system operated exactly as the standard semiautomated variable can system and took no extra time. Surveys of customers participating in the hand-dump system trial showed that it was very popular. Participating residents reduced waste 15 percent by weight over the course of the testing.

In our research, we found that with the weight-based system, there are advantages to customers buying their own containers. The cost is lower and, if the garbage is hand-dumped, you do not need standardized containers. Under a semiautomated system, however, you might have to require customers to buy specific containers.