the amount of water used via price (i.e., drought surcharges). In this approach, only the volumetric portion of the rate has a surcharge applied to it. Depending on how the volumetric surcharge is applied, it potentially allows a utility to be more specific in the customers that the surcharge targets and in the impact on demands of different user groups. Volumetric surcharges have greater revenue risk and variability than fixed fee surcharges.

Percentage Bill

This approach simply places a fixed percentage surcharge on the total bill of the customer. The percentage bill approach is simple and straightforward and can be accomplished in two ways. First, each of the rate components of the entire rate structure may be increased equally to produce the incremental amount of revenues. This approach does not explicitly separate the surcharge from the rates. Alternatively, the bill can be computed at current rates, and then a percentage surcharge assessed in addition to that amount. This approach is more explicit in that the surcharge is clearly identified.

DETERMINING DROUGHT SURCHARGES

Drought surcharges are a specific form of rate surcharge used during a drought. A water utility typically has two overriding objectives during a drought. The first is to reduce the volume of water used by its customers to reflect the utility's potentially reduced and constrained water supply resources. This reduction is usually accomplished by a combination of actions, such as appealing to customers to voluntarily reduce water demands, placing mandatory restrictions on discretionary water uses (often outdoor uses such as irrigation and car washing), and increasing rates or adding surcharges as incentives to reduce water demands. The goal is to immediately reduce demands on water supplies made scarce by the drought. The second objective during a drought is to maintain adequate revenues to meet system revenue requirements. To the extent that the first objective (i.e., water-use reduction) is met, it is often correspondingly more difficult to meet the second objective. To deal with this situation, many utilities draw on financial reserves, reduce budgeted expenditures (although during a drought, a utility will often incur unbudgeted costs), and implement drought surcharges.

DROUGHT SURCHARGE CONSIDERATIONS

Revenue forecasting for post-drought pricing periods should anticipate the potential for long-term effects on demand patterns arising from the temporary drought conditions. Drought surcharges are intended to reduce demand immediately as a precautionary or emergency response to a temporary and severe limitation in water supplies. Once the drought or emergency has passed, drought surcharges may be removed or revised to align with longer-term pricing objectives, which may be achieved through normal rate setting. In contrast, conservation pricing is designed to permanently reduce or modify total annual demand or alter demand patterns and often is an institutionalized characteristic of a utility's rate structure. Notably, however, depending on the duration and severity of a drought and the effectiveness of the drought surcharges, permanent reductions in water usage may be induced, although this may not be the intended consequence of the drought surcharge strategy.

The approach used for drought surcharges may blend the drought surcharge with existing rates, or the drought surcharges may be a separately identified surcharge on a customer's bill. A utility's ability to select between these two approaches may be limited

by its billing system and either approach can be effective, although a separately identified drought surcharge provides a clearer price signal to customers.

Types of Drought Surcharges

Surcharges are often used as an emergency and temporary fee to pay for costs associated with purchasing emergency water supplies during a severe drought or to support drought restrictions. When drought conditions result in the need to purchase emergency supplies, a surcharge is a logical and simple way to pass along the additional temporary cost of acquiring these high-cost water resources to the current users who require the water supply. Often, surcharges used during drought conditions are also intended to provide a price incentive for customers to reduce water demand. In both of these cases the surcharge can be in place while the drought exists and can be removed once the drought has ended. Excess funds are generated from surcharges imposed solely to encourage conservation, above those needed to meet potentially increased costs, and should be set aside in a reserve fund to be used for future drought-related mitigation purposes, such as development of additional sources for supply.

The following paragraphs describe the different approaches for setting drought surcharges.

General rate adjustment. One method of rate setting during a drought is to implement a drought surcharge on all commodity rates. For example, all volume rates (regardless of the rate structure) could be increased by a specific percentage estimated to yield an acceptable level of demand reduction, while still generating the required revenue requirement from the decreased consumption. Although this is a relatively simple and unsophisticated method of developing drought surcharges, customers might better accept this approach because it may be perceived as treating all customers "equally." This method of establishing rate surcharges is also relatively easy to explain to customers and implement for billing purposes. However, this method does not target those users or end uses most able to reduce water demands or most likely to respond to price changes. Finally, the drought surcharge component is not explicitly identified under this approach and may not clearly communicate the drought issue to the customer. Thus, while this approach is simple and appears to treat customers equally, its lack specificity, and transparency may ultimately make it less acceptable.

General volumetric surcharge. To better communicate the price impact to customers of using water during a drought, many utilities implement separate drought surcharges that are distinct from their established water rates. A general volumetric surcharge provides incentive for customers to reduce demand and specifically identifies on their bills the cost impacts of using water during periods of drought. Volumetric surcharges may take many forms, including ones that uniformly apply the surcharge over all consumption blocks, relate the surcharge to consumption beyond a stated level (e.g., a surcharge applied to consumption over 10,000 gallons per month), or include graduated increases in the surcharge as consumption increases (i.e., an increasing block surcharge). Although this form of drought surcharge may be effective in communicating cost impacts, it is also a relatively blunt pricing technique that does not target specific individualized customer uses (i.e., residential versus commercial) or consider whether or not specific customers have the ability to reduce their consumption (discretionary versus nondiscretionary use).

Class-based volumetric surcharges. A variation of the general volumetric surcharge approach is to establish quantity limits per customer for different classes of users and to apply a surcharge to any user exceeding the limit for that class. In essence, this is a volumetric surcharge by customer class of service. This approach requires establishing reasonable consumption targets based on the consumption characteristics for each class. Often, the target setting can be performed in a reasonable and relatively equitable manner

for single-family and multiple-family residential customers, with the latter group set on a per-dwelling-unit basis. It is more difficult to set uniformly applied quantity limits for commercial and industrial customers than residential customers because of diversity in the number, types, and sizes of commercial and industrial customers. This diversity limits the extent to which volumetric surcharges may be equitably applied to commercial and industrial customers. As a result, this approach may be less effective in achieving the desired consumption reduction targets for commercial and industrial customers than those applicable to relatively homogeneous residential consumption.

Individualized volumetric surcharge. Another approach is to apply drought surcharges to users whose water demands exceed a specified percentage of their base-period water use. For example, the utility might apply a 25 percent surcharge to any customer with water use greater than 80 percent of that customer's average demand during a previous base period. This approach sets a clear water reduction target for each individual user and provides reduction incentives to all customers. An individualized approach can also recognize variations within a class, such as household size and lot size that may be important in setting target consumption levels. Agricultural and irrigation limits might be based on the type of crop or plant being watered and the acreage. While this approach places a similar reduction requirement on all customers, there remains a disadvantage of using historical usage characteristics to establish targeted levels of reduction. In those instances where a customer is already using water efficiently, the customer has less of an ability to reduce their demand and thus avoid a surcharge while a customer whose water use has been the least efficient has the greatest opportunity for avoiding the surcharges. Individualized approaches are limited to utilities that have billing systems that can set individualized consumption goals or consumption thresholds.

Targeted volumetric surcharge levels. A utility could target certain customer classes for larger surcharges than others. Such classes would include those that have more discretionary use and should be able to more easily reduce water use. This approach avoids affecting customers whose water demands are extremely inelastic or are desirable from a public health or other policy perspective. For example, a utility might place a high surcharge on residential outdoor usage and might not apply the same level of surcharges to hospitals or public schools. A major concern with this approach is that the utility may be criticized for targeting some customer groups and exempting others. There are also certain legal implications and considerations to this targeted approach. Implicit in this tactic is the ability of a utility to evaluate and make conclusions about the relative merit of one use of water over another.

Drought Surcharge Policy Issues

Drought management plan. In a drought, policymakers are faced with many decisions requiring them to balance water supply management imperatives, customer and community needs, and the potential financial consequences of drought response. When prepared in advance, a drought management plan can provide well-thought-out and comprehensive guidance in times of drought. A well-prepared drought management plan should provide clear policy direction as it relates to declaring a drought. The drought management plan will also discuss the various specific "stages" of drought and the target reductions of water use for each stage. The drought management plan provides the planning basis for, and the targeted savings from, the drought surcharges. These plans should include drought pricing and financial management strategies as well as water resource strategies.

Timing for implementation of drought surcharges. With the development of a drought management plan, the utility has a clear understanding of the various stages of drought, the actions to be taken, and the needed consumption savings. The drought

management plan frequently establishes clear criteria for declaring when a utility is in a drought. Drought management plans typically classify droughts as to their severity (e.g., Stage 1 through Stage 5). Given the key information contained within the drought management plan, a utility can develop drought surcharges well in advance of a drought. The drought surcharges can be adopted and in place, ready to be implemented when a drought stage is declared by the governing body of the utility. Once the drought stage is declared, the associated drought surcharges become effective until the drought stage changes or the drought is declared to be over. By developing the drought surcharges in advance of an actual drought, and using the information contained in the drought management plan, the utility can carefully consider the various options available for establishing equitable drought surcharges and any billing system limitations.

Revenue sufficiency. Although drought pricing can help a utility manage the revenue reductions that result from reduced water sales, it is likely that the utility will need to also use its financial reserves as well as reduce and defer planned expenditures. Because the duration of a drought is not known (i.e., 1-year events versus 10-year events), utilities cannot be certain about how long their reserves will last and thus should draw on them cautiously, especially insofar as the ability to replenish them is limited during the drought.

Ideally, a well-designed drought surcharge should hold customers harmless if they comply with the desired and targeted savings levels. In other words, a customer that has a targeted Stage 1 reduction of 10 percent and reduces their consumption accordingly may pay roughly the same bill as before the drought and produce the same level of revenue because the pricing of the surcharge has been structured to recover the same level of revenue, assuming a 10 percent reduction in consumption. The difficult and challenging part of establishing drought surcharges is the uncertainty of how customers will respond and what reductions in consumption will be realized. When reductions in consumption are greater than the targeted level, the utility may have a budget shortfall. If the reductions in consumption do not occur, the utility should collect more than their revenue requirement.

Additional and/or deferred expenses. A drought response often requires additional expenses beyond the anticipated revenue requirement and may at the same time require the deferral of other anticipated expenses within the utility's revenue requirement. The additional expenses may be a function of the need to obtain additional and costly water supply, additional pumping costs, and so forth. In addition, expenses may be incurred to impose water-use restrictions in the event that the utility elects active enforcement of its rules. The utility will also likely incur additional costs associated with public outreach and communication. The drought management plan may have estimates of the unplanned expenditures for each drought stage. At the same time, capital projects may be postponed or deferred during a drought to help preserve cash flow and reserves.

Equity. Cost-of-service rate-making considerations are a recommended practice when establishing the utility's overall general rate structure. However, variance from the traditional cost-of-service principles may become necessary when implementing emergency drought surcharges, which include controlling demand and recovering total system costs. In designing drought surcharges, a utility should consider the price and demand response of various types of water uses and target those that are the most discretionary and responsive to price. This may or may not strictly relate to cost-of-service considerations.

Bill presentation and accounting issues. If the drought surcharges are intended to integrate with the other drought-related programs, it should ideally be clearly communicated to customers on their bill. This means that the drought surcharge should be presented as a separate line item on the bill. Utilities should also have a method for tracking the amount of drought surcharge revenue they receive from each customer class. This is important for accountability and transparency reasons during the drought. After the drought, this will provide valuable information for analysis purposes.

Customer acceptance. Customer acceptance and ease of implementation are important considerations in selecting a drought surcharge approach. Customers naturally expect their water reduction efforts during a drought to be recognized and perhaps rewarded, not penalized. In designing the surcharge rates, and as previously discussed, if all customers respond appropriately, consumption will decrease. The surcharge rate should, if properly designed, make the utility financially whole (i.e., lower use multiplied by the higher surcharge rate should produce revenue that equals the revenue requirement). For the customers who respond appropriately (e.g., save the reduced level of usage suggested in the drought plan), their bill should be roughly equal to what they pay under normal water conditions. Those customers that do not choose to conserve will appropriately end up with increased bills. Accordingly, to achieve the expected results of the surcharge, a vigorous educational campaign is important in explaining the drought pricing rationale and gaining its acceptance by customers.

Media relations. Working with the media during a drought is critical for providing information to customers about the severity of the drought, desired customer responses, and the need, purpose, and implications of drought pricing strategies. As it relates to drought surcharges, the utility should provide information about when the drought surcharges might go into effect, the potential magnitude of the surcharges, and their purpose. It should also explain that drought surcharges are one tool in a set of measures that the utility is using to engage the community in effective water resource management.

Removal of drought pricing. Just as it is complicated to know when to implement drought surcharges, it is just as complicated to know when the drought is over and to remove these surcharges. Caution is needed to avoid removing the drought pricing prematurely and then having to re-implement the drought surcharges. Formal action declaring the end of the drought should be the basis for the removal of the surcharges.

DROUGHT SURCHARGE EXAMPLE

In this example, the drought surcharges are triggered by the severity of the drought (Stage 1, Stage 2, etc.). For increasing levels of severity, more aggressive pricing policies are implemented as part of a comprehensive drought management plan to change customer behavior and reduce water demand. These drought surcharges are instituted when a declaration is made that a drought emergency exists. The basis around which the drought surcharges are established is related to the estimated price responsiveness and price elasticity. Assuming an average price elasticity response of –0.1 to –0.2 for a relatively large change in price, a 25 percent increase in the commodity charge would yield a demand reduction of about 2.5 percent to 5 percent, all other factors remaining constant. It is presumed that other drought responses (i.e., restrictions and public education) will complement and add to this reduction.

During a moderate Stage 1 drought, the following actions would be taken:

- Single-family rates are assessed a surcharge of 25 percent that is applied to the two upper blocks (i.e., more discretionary use). The initial block is assumed to be more "essential needs."
- The multifamily, commercial, and industrial rates under normal water conditions are converted from uniform block rates to increasing two-block rates. Block 1 remains at its current level, and block 2 is indexed to the block 2 rates for the single-family class.
- Irrigation rates are also converted to a two-block rate. Block 1 increases by 25 percent (because all outdoor irrigation use is considered discretionary), and block 2 is indexed to the block 3 rates for the single-family class.

Table V.3-1 Drought surcharge pricing example ($ per 1,000 gallons)

Customer Class	Non-Drought, Normal Water	Stage 1, Moderate Drought	Stage 2, Severe Drought	Stage 3, Critical Drought
Single-Family Residential				
Block 1	$1.00	$1.00	$1.10	$1.50
Block 2	$1.50	$1.87	$2.25	$3.00
Block 3	$2.00	$2.50	$3.00	$4.00
Multiple-Family Residential				
Block 1	$1.25	$1.25	$1.38	$1.87
Block 2	$1.25	$1.87	$2.25	$3.50
Commercial/Industrial				
Block 1	$1.30	$1.63	$1.79	$1.95
Block 2	$1.30	$1.87	$2.25	$3.50
Irrigation				
Block 1	$1.75	$2.19	$2.63	$2.89
Block 2	$1.75	$2.50	$3.00	$4.00

NOTE: For example only and based on specific assumptions.

If the drought situation worsens to a Stage 2 severe drought, a greater emphasis is given to targeting outdoor usage with higher prices:

- Block 1 rates for all customers are adjusted, but at moderate levels, particularly for single-family and multifamily customers, because their block 1 use is considered to be nondiscretionary or essential and is less sensitive to price.
- Blocks 2 and 3 rates are increased, creating a steeper pricing curve to the customers as they use more water. The single-family residential blocks 2 and 3 are increased by 50 percent of their normal water condition level. Multifamily and commercial/industrial block 2 rates are indexed to the single-family residential rate and irrigation consumption. Irrigation class usage, which is deemed the most discretionary, in block 2 is priced at the block 3 single-family residential level.

Finally, if the drought situation became critical (Stage 3), the utility would need to increase the price incentive to reduce demand. In this case, the utility might implement the following actions:

- Block 1 for all customers, except irrigation, would increase by 50 percent over its normal level.
- Single-family residential blocks 2 and 3 would increase by 100 percent over their normal levels, increasing the price curve to these customers for outdoor usage.
- Multifamily and commercial/industrial block 2 would be indexed to the midpoint between blocks 2 and 3 for single-family residential customers.
- Irrigation block 2 rates would be indexed to the block 3 single-family rates.

This example for drought rate adjustments is summarized in Table V.3-1. A utility should carefully plan the details for implementation. This phased-in approach to rate setting in a drought is designed to reduce water demand and yet maintain as much of the revenue stream for the utility as possible under various levels of water shortage.

This example, while greatly simplified, provides an overview of the basic approach and considerations that may be used in the pricing and development of drought surcharges. As the drought surcharges are analyzed and developed, consideration must be given to the overall reductions in use needed under the particular drought stage and the overall revenue impacts.

The characteristics of the utility's customer base, water supply, and constraints on resources should be evaluated in tailoring a drought surcharge approach that will best meet the utility's needs. Careful planning and effective customer communication will enhance the likelihood that drought surcharges will help secure required changes in water demand patterns and gain general community acceptance.

SUMMARY

Rate surcharges can be an effective means for financially protecting the utility during periods of severe drought or other natural disasters. Surcharges may also provide an effective means to fund specific improvements or build necessary reserves for future requirements. Although rate surcharges have limited application and may also be politically sensitive to implement and subject to legal constraints, they can help stabilize rates over the long term and provide other nonfinancial benefits, such as achieving needed reductions in consumption during drought periods.

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Chapter V.4

Low-Income Affordability Programs

This chapter addresses low-income affordability programs, which are intended to help mitigate financial impacts for customers who are less able to pay for water, which is an essential service. As further defined in this chapter, affordability programs can include a range of rate and bill discounts for low-income customers, but can also include other programmatic support efforts, such as assistance with water audits or assistance in reducing water consumption. The chapter is included in this manual to provide guidance to utilities interested in developing affordability programs or in enhancing existing programs. It provides a description of the primary rate-related strategies employed to address affordability, such as percentage bill discounts. It also provides examples of some additional program elements employed by some communities, such as assistance in conducting water audits or repair programs to help customers reduce water consumption. It also provides a brief introduction to selected related policy and management topics. It does not address or provide a comprehensive survey of the nonrate issues, strategies, or research associated with low-income and affordability programs. Nor does this chapter attempt to define an affordability threshold, a specific set of charge or demographic circumstances at which the financial burden to a household is deemed excessive, or metrics for communities to use as a guideline in defining such a threshold.

Affordability programs are of increased interest in the water industry for several reasons. Recently, some states, local communities, and multinational organizations such as the United Nations (2010) have more formally recognized water as a human right. The United Nation's declaration of water as a human right has had ripple effects on the affordability of water service in the United States, especially in states like California. California's Proposition 218, an initiative-based amendment to the California Constitution enacted into law by ballot in 1996 that essentially allows utility customers an opportunity to vote against a proposed rate increase, has also drawn attention to the issue of affordability.

With increasing costs associated with regulatory mandates and aging infrastructure, water (and wastewater) rates continue to rise. Given that income level growth has stagnated (Hughes, et al. 2014) in recent years, it is possible that the price of water service will increase to the point that even more low-income households will have difficulty in

paying the bills for this service when calculated based on the cost-of-service principles defined throughout this manual. While the focus of this chapter is on programs to help address affordability for low-income residential customers, it is important to recognize that increases in utility rates and charges can also have significant impacts on commercial and industrial customers, particularly customers whose processes and operations require considerable amounts of water.

While disconnection for nonpayment is a common and effective billing and financial management strategy used by utilities to address financial challenges posed by customers who do not pay their bills, it does not resolve the social or public policy questions regarding the proper response of a utility to affordability challenges. Furthermore, this approach imposes collection and shutoff costs that must be included in a utility's operating costs. In the past, many utilities used nonrate strategies to address payment concerns, but as rates move upward to reach the fully allocated cost of water, more utilities are implementing structures that consider affordability as part of their response to addressing the needs of low-income residential customers.

The overall affordability challenge facing utility managers is substantially broader than addressing the economic concerns of the low-income households previously described. As a result of the combined effect of increased regulations and the need to renew and replace aging utility assets that were built as much as a century ago, water and sewer rates have increased at rates greater than most consumer commodities during the past 10 years (Hughes, et al. 2014). Because water and wastewater service is a necessity in modern society, there is an essential threshold of water use that is required by all individuals. Issues related to a number of public policy and legal matters, as well as political or management challenges, frequently arise when considering affordability programs for a specific utility. Consequently, affordability issues are becoming more important to many utilities. Perhaps ironically, in addition to addressing utilities' social responsibilities as major economic actors in their communities, providing a method for lessening the financial impact of rate increases on low-income and fixed-income residential customers has helped utility managers secure needed rate increases from utility governing boards.

It is important to note that affordability and low-income rates and programs are a policy decision of the governing body of the utility, and, in some cases, utilities' governing boards or management take the position that it is not the role of a water utility to address society's low-income or affordability issues. That viewpoint is not shared by all utilities or policymakers, but it does highlight the range of differences of opinion on this topic. Moreover, in many states, legal constraints limit the forms and sources of funding for low-income affordability measures.

Although the focus of this manual is on water rates, this chapter makes reference both to water and wastewater rates. This is done for several reasons. Regulatory pressures on many wastewater systems since the early 2000s have resulted in substantial capital program requirements often funded through rate increases. These wastewater program financing challenges and related policy discussion on community financial capabilities have resulted in productive research and discussions related to affordability challenges. This chapter references the key affordability ideas and issues developed in that context. The combined impact of paying for both water and wastewater service may be what puts some residential customers past the point at which they can pay the bills for these essential services. This is increasingly acknowledged as an important consideration by utilities, industry associations, and regulators. The US Environmental Protection Agency's (USEPA's) release of an integrated planning framework in early 2013 acknowledges the need to consider more holistically the financial requirements imposed by the spending needs of water and wastewater systems (USEPA 2013). Also, many water utilities provide wastewater service and the two services are included on a single customer bill.