What Does Water Really Cost? Rate Design Principles for an Era of Supply Shortages, Infrastructure Upgrades, and Enhanced Water Conservation

Scott J. Rubin, J.D.

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Executive Summary

Supply shortages, water main breaks, water conservation, and other challenges call for clarity in water rate design. In most jurisdictions, water ratemaking is based on principles and rate designs established many decades ago. But substantial changes are occurring in the design of water rates, particularly in areas experiencing water shortages. Further, some of the basic principles of water rate design have fallen into disuse by regulators and expert witnesses, impeding the ability of commissions to meet these challenges by setting rates that bear a reasonable relationship to the cost of serving different types of customers.

Nearly fifty years ago, Professor Bonbright suggested that the most important rate design criteria are adequacy (collection of the revenue requirement), efficiency (encouragement of economically efficient consumption and discouragement of waste), and fairness to all customer classes. Those standards remain valid goals today, but the method of achieving them in the water industry has changed over the years.

Generally, differences in water rates should be based on differences in costs the utility incurs to serve different types of customers rather than on characteristics of the customer that have no impact on the utility's cost of service. Thus, the primary purpose of designing any utility's rates is to recover the utility's revenue requirement in a manner that does not require any class of customers to pay significantly more or less than the cost of providing service to the class. But those are not the only appropriate rate-design goals. Water rates are used to encourage conservation, promote economic development, improve the affordability of service to low-income customers, and implement other public policy goals. Each of those goals can be achieved in a manner that is consistent with the cost of serving different types of customers, but doing so requires careful attention to detailed data about costs, customer consumption, and demand patterns.

Three types of rate structures dominate water rate design: declining-block rates, uniform usage rates, and inclining-block rates. In recent years, there has been a trend away from using declining-block rates and toward the other two rate forms. Some of that movement has been the result of a misunderstanding of the purpose, and proper design, of declining-block rates. When properly designed, declining-block rates remain a valid rate form that is consistent with cost-of-service principles. Declining-block rates also enable a utility to serve all customers on a single rate schedule, avoiding the need for the precise classification of customers (for example, is an apartment building residential or commercial?).

Uniform usage charges, often by customer class, have become the most popular water rate structure. When using this rate form, care must be taken to develop customer classes that have similar demand and consumption characteristics, so that similarly situated customers do not pay different rates. Commissions also must be careful to avoid developing customer classes that have customers of vastly different size. If customer classes are not relatively homogeneous, the uniform usage rate charged to larger customers in the class will not reflect the lower per-unit cost of distributing a large volume of water to one customer, resulting in unwarranted subsidies to smaller customers in the class.

Inclining-block rates have become an important method of encouraging water conservation. Such rates should be designed based on differences in the cost of serving customers who contribute to the system's peak demands, not just on customers who use large amounts of water throughout the year. When changing from a declining-block rate structure or a uniform usage structure to an inclining-block rate structure, regulators must be sensitive to the possible effects on customers who differ from the "average," such as large commercial and industrial customers, renters, and large families.

During the past two decades, several municipally owned utilities and at least one investor-owned utility, primarily in the western United States, have developed a new type of water rate, known variously as customer-specific rates, tailored rates, or water budgets. This new type of water rate structure is an inclining-block rate in which the size of each block varies depending on the characteristics of each customer. Depending on the specific criteria that regulators choose to affect the size of each consumption block, changing to customer-specific rates can lead to substantial rate increases for some customers. Adversely affected customers are likely to challenge the lawfulness, appropriateness, and cost basis of these rates when used for investor-owned water utilities. To avoid such challenges, commissions must ensure not only that the rate structure helps to meet conservation goals, but that the classifications used to determine customer-specific rates bear a reasonable relationship to the utility's cost of serving customers.

In order to implement public policies, many commissions are authorized to adopt special rates for particular types of customers or to expedite the recovery of certain types of cost increases. Promoting the local economy and the affordability of utility service, for example, are important public goals, but regulators should not leave behind cost-of-service principles when attempting to implement those types of policies. When properly designed, rates that encourage customers to remain on the system, or that attract new customers, can help spread the utility's fixed costs over a larger customer base, which can provide a benefit to all customers. Similarly, rate discounts that improve the collection of bills, thereby reducing collection costs and working capital requirements, also can benefit all customers if properly designed and implemented. These types of special rate forms do not require the abandonment of Bonbright's essential rate design principles.

After reading this paper, regulators will have a better understanding of essential water rate design principles and be able to make informed choices about the appropriate rate structure for investor-owned water utilities.

Table of Contents

Introduction

Supply shortages, water main breaks, water conservation, and other challenges call for clarity in water rate design. In most jurisdictions, water ratemaking is based on principles and rate designs established many decades ago. Water utilities, regulators, and public advocates rely on two major reference works for designing water rates: the "M1 manual" published by the American Water Works Association (AWWA),[1] and a cost allocation and rate design manual jointly published by NRRI and the Water Research Foundation (formerly the American Water Works Association Research Foundation).[2] These two works are 10 and 20 years old, respectively, and were prepared for use by the entire water industry, most of which consists of publicly owned utilities.[3]

This paper will focus on rate design issues for investor-owned water utilities, including the challenges of designing rates during an era of supply shortages, enhanced water conservation, and extensive infrastructure replacement spending. The focus on investor-owned utilities is important for at least three reasons. First, while the two books referred to above continue to provide useful information for utility commissions and practitioners, substantial changes have occurred in the design of water rates since their publication. Second, regulators and expert witnesses fail to apply some of the central teachings of those manuals. Third, important differences exist between rate designs that are reasonable or appropriate for an investor-owned utility and those that are appropriate for a publicly owned utility.

Part I provides an overview of basic rate design principles and purposes for any type of utility. The concept of a "just and reasonable" rate is discussed, along with other fundamental rate design principles.

Part II provides a review of essential rate design principles and rate structures for water utilities. In recent years, there has been significant movement away from declining-block rates for water utilities. That trend is designed to help encourage water conservation, but as explained below, regulators must be careful to ensure that rates continue to reflect important differences in the cost of serving different types of customers.

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[1] American Water Works Association, *Principles of Water Rates, Fees, and Charges* (Denver, CO, 5th ed., 2000) (hereafter "AWWA Manual M1"). The comparable manual for the wastewater utility industry is Water Environment Federation, *Financing and Charges for Wastewater Systems*, WEF Manual of Practice No. 27 (New York, NY, 2005).

[2] Janice A. Beecher, et al., *Cost Allocation and Rate Design for Water Utilities*, NRRI No. 90-17, AWWARF No. 90590 (Columbus, OH, and Denver, CO, 1990) (hereafter "Beecher").

[3] "Publicly owned utilities" here means utilities that are government-owned as distinct from entities that are shareholder-owned.

A new form of water rates, customer-specific rates, has been developed in water-short areas of the western United States. Part III explores this new type of rate and discusses its potential usefulness for investor-owned water utilities throughout the country.

Water rates are variously used to encourage or guide economic development, maintain or improve the stability of a utility's revenue stream, promote water conservation or discourage waste, ensure the provision of affordable service to low-income consumers, and restrict outdoor water use during droughts and other water shortages, among other things.[4] Part IV discusses some of these special-purpose water rates.

Finally, proposals for automatic rate adjustment mechanisms have become common among investor-owned water utilities. Part V discusses these types of rates, their relationship to established ratemaking principles, their relationship to cost, and the incentives and disincentives each may provide to utilities and consumers.

[4] For a useful paper on the multiplicity of rate design purposes and how different rate design assist or impede those purposes, see A. Pollock and E. Shumilkina, *How to Induce Customers to Consume Energy Efficiently: Rate Design Options and Methods*, NRRI Publication 10-03 (January 2010), http://www.nrri.org/pubs/electricity/NRRI_inducing_energy_efficiency_jan10-03.pdf.

I. Essential Rate Design Principles

In most jurisdictions, water utility rates are required by law to be "just and reasonable," but that term is rarely defined in a statute. The characteristics of a "just and reasonable" rate are left to regulatory commissions and courts to determine. The "just and reasonable" standard typically refers to the specific ***rates*** that are charged by the utility—what is referred to as the "rate design" or "rate structure." For example, Pennsylvania's Public Utility Code states: "*Every rate* made, demanded, or received by any public utility … *shall be just and reasonable*, and in conformity with the regulations or orders of the commission."[5] New York's Public Service Law contains a similar directive for water rates: "*All charges* made or demanded by any such water-works corporation for water, or for equipment furnished or for any service rendered or to be rendered *shall be just and reasonable* and not more than allowed by law or by order of the commission."[6]

In their seminal works on utility regulation, Professors Bonbright and Phillips agree on the essential criteria for a sound rate structure:

- Practicality, including simplicity, understandability, ability to implement, and public acceptability;
- Clarity in its interpretation;
- Effectiveness in yielding the total revenue requirement;
- Stability in revenues from year to year;
- Continuity of rates, including the concept of gradualism;
- Fairness in relation to the cost of serving different types of customers;[7]
- Avoidance of undue discrimination among similarly situated customers; and
- Encouragement of efficient consumption practices.[8]

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[5] 66 Pa. Consolidated Statutes § 1301 (emphasis added).

[6] NY Public Service Law § 89-b(1) (emphasis added).

[7] The "fairness" of a utility rate generally means that the rate bears a reasonable relationship to the utility's cost of serving the customer without exceeding the value of service to the customer. See, e.g., James C. Bonbright, *Principles of Public Utility Rates* (New York, NY, 1961) (hereafter "Bonbright"), pp. 82-92; Leonard Saul Goodman, *The Process of Ratemaking* (Arlington, VA, 1998) (hereafter "Goodman"), vol. II, pp. 893-895.

[8] Bonbright, p. 291; Charles F. Phillips, Jr., *The Regulation of Public Utilities: Theory and Practice* (Arlington, VA, 1993), pp. 434-435.

Bonbright suggests that the most important of these criteria are adequacy (collection of the revenue requirement), efficiency (encouragement of economically efficient consumption and discouragement of waste), and fairness to all customer classes.[9] He notes that these criteria are primary "not only because of their widespread acceptance but also because most of the more detailed criteria are ancillary thereto."[10]

"Just and reasonable" rates have been defined as rates that are consistent with these rate design criteria. For example, the Vermont Public Service Board states that it has "long used Bonbright's three criteria of adequacy, efficiency, and fairness when considering rate designs. It is appropriate for us to consider those principles when evaluating the reasonableness [of a proposed change in rate design]."[11] See also a decision by the Supreme Court of Rhode Island relying on Bonbright's complete list of rate design principles in upholding the reasonableness of a utility's rate design, even though it did not strictly follow the results of a cost of service study.[12]

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[9] Bonbright, p. 292.

[10] *Id.*

[11] *Investigation into Village of Morrisville Water and Light Department's tariff filing*, Docket No. 7332, 2007 Vt. PUC LEXIS 295 (VT Pub. Svc. Bd., December 13, 2007), citing cases dating back to 1981.

[12] *U.S. v. Pub. Util. Comm'n of Rhode Island*, 635 A.2d 1135, 1141-42 (R.I. 1993).

II. The Basics of Water Rate Design

A. Introduction

Regulators recognize that water service is essential to public health and sanitation. Water also is an irreplaceable engine for commerce; it is difficult (and in many areas impossible) to sustain economic activity without a plentiful and reliable supply of water—for sanitation, human consumption, food preparation, and numerous commercial activities and industrial processes. As such, it is important to ensure that water service is available throughout a utility's service area, that the rates bear a reasonable relationship to the utility's cost of providing service, and that the rates charged do not exceed the value received by the customer.

As discussed in Part I above, the primary purpose of designing any utility's rates is to recover the utility's revenue requirement in a manner that is fair and based on the cost of providing service. But those are not the only appropriate rate-design goals. The Connecticut Department of Public Utility Control summarized the numerous goals of a water rate design, as follows:

> Conservation of water and energy resources is a goal of the State and of the Department. Rate structures for all utilities should be designed with an eye towards that goal. However, conservation is just one of the several legitimate goals to be advanced through rate design. Another goal is revenue stability, i.e., the reasonable opportunity for a utility to recover through rates the revenues it has been awarded. Cost responsibility is also an appropriate principle to be reflected in rate design.
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> In general, rates should be designed so that customers are charged rates that reflect the costs they cause a company to incur on their behalf. It is also a goal of rate design to promote economic development and to ensure that large use customers, among them manufacturers, are encouraged to locate, remain, and expand their operations within Connecticut. It is the purpose of regulation and rate design to harmonize and reflect the aforementioned goals in an economically and administratively coherent fashion. No one goal should be permitted to displace the others.[13]

B. The base-extra capacity method

The first step in the process of setting water rates that meet a community's needs is to perform a cost-of-service study. A cost-of-service study provides regulators and the public with information about the utility's cost to serve different types of customers. Customers usually are classified into categories such as residential, commercial, industrial, publicly owned, and fire

[13] *Application of Stamford Water Co.*, 125 PUR4th 339 (Ct. DPUC, 1991).

protection. Most cost-of-service studies for water utilities are prepared using the base-extra capacity method ("BECM") described in the AWWA manual.[14] The BECM usually allocates costs among five categories:

- *Base costs* that are incurred to meet average water consumption throughout the year, such as the cost of chemicals to treat the water.

- Extra capacity costs to meet *maximum daily demands*, such as pumping equipment that is used to move water during peak periods.

- Extra capacity costs to meet *peak hour demands*, such as some water storage tanks.

- *Customer-related costs* that vary with the number of customers but are unrelated to water use, such as billing and meter-reading costs.

- Costs that are related to *fire protection*, such as the cost of fire hydrants.

As explained in Part II.D below, the BECM is designed not only to allocate costs among customer classes, but also to provide important information to help design cost-based rates. Many practitioners and regulators, however, fail to recognize the importance of using the BECM in designing water rates. Indeed, it has become common in some jurisdictions for water cost-of-service studies to focus solely on the result—the cost allocated to each customer class—while ignoring (and sometimes not even reporting) essential components of those costs, including the base costs and extra capacity costs that lie at the heart of a BECM study.

C. Unmetered (flat) rates

Historically, many water utilities provided service under flat rates (also known as unmetered rates); that is, the customer paid the same amount each month regardless of the amount of water used. The "rate" was a rate per customer, or sometimes a rate per plumbing fixture (so much per month for each toilet, shower, bathtub, etc.), rather than a rate per gallon of water used.

Flat rates made sense when water was inexpensive and plentiful; the cost of purchasing, installing, and reading meters was high; and many older homes (especially multi-family buildings) were not designed to readily enable the cost-effective installation of water meters. Indeed, one of the nation's largest water utilities, New York City, did not require water meters until 1988.[15]

Unmetered water service is no longer common among larger water utilities, but there are still some small water utilities that provide service without meters. The cost of treating and distributing water is high enough, and the cost of metering technology is low enough, that it is

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[14] AWWA Manual M1, pp. 51-57.

[15] David Stipp, "In Crowded East, Water Becomes Gold -- Heavy Demand, Pollution Strain Supplies, Nerves," *Wall Street Journal*, Aug 30, 1989, p. 1.

usually cost-effective to meter water service. Moreover, providing unmetered service is inconsistent with the efficient and economic use of water, in that it fails to provide the consumer with any price signal concerning the value or cost of the service. Beecher concludes: "Most analysts reject the idea of flat fees because they send a poor price signal to customers about the cost of water service; nor do they provide an incentive to conserve. Flat fees, in fact, tend to encourage waste."[16]

Some water utilities, however, continue to use flat rates for certain groups of customers where metering would be prohibitively expensive or otherwise impractical.[17] This can arise when a housing development was built without separate water service lines for each home or other plumbing configurations that make it costly to isolate water consumption for each housing unit. These customers pay the same amount each month without regard to the amount of water they use.

When unmetered service is provided to a small group of customers within a largely metered utility, it is appropriate to establish the flat rate by assuming that each unmetered customer uses at least the same amount of water as a typical metered customer. For example, the Connecticut Department of Public Utility Control set the flat rate for a small group of unmetered customers by comparing it to a metered customer who uses 800 cubic feet of water (approximately 6,000 gallons) per month.[18] Similarly, the Public Utilities Commission of Ohio set a flat rate for a small group of unmetered customers by using an average metered customer's consumption, less the average cost of metering and meter reading.[19]

D. Metered rates generally

With few exceptions, water utilities charge metered rates for service. Rates often are based on a combination of a fixed charge, which is often termed a customer charge or meter charge (such as $10.00 per month for a customer with a 5/8-inch meter), and a variable charge that is applied to the amount of water that flows through the meter (for example, $3.00 for each 1,000 gallons of water).

There are three major types of metered rates: *declining-block* rates (the more water a customer uses, the lower the rate per unit of water), *uniform rates* (the same rate is charged for all water), and *inclining-block rates* (the more water a customer uses, the higher the rate per unit of water). During the past 25 years, there has been an important shift away from declining-block rates and toward either uniform or inclining-block rates. For example, a survey of more than 200

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16 Beecher, p. 106.

17 See, e.g., *California Water Service Company*, 2007 Cal. PUC LEXIS 607; *Aquarion Water Co. of Connecticut*, 262 PUR4th 81 (Conn. DPUC 2007); *Carolina Water Service, Inc. of North Carolina*, 2007 N.C. PUC LEXIS 221; *Ohio-American Water Co.*, 2008 Ohio PUC LEXIS 696.

18 *Aquarion Water Co. of Connecticut*, 262 PUR4th 81 (CT DPUC 2007).

19 *Ohio-American Water Co.*, 2008 Ohio PUC LEXIS 696.

utilities conducted for AWWA showed that in 1996 36% of utilities had declining-block rates, but by 2006 that percentage had dropped to only 24%. The percentage of utilities with uniform rates increased from 32% to 40%, while the percentage with inclining-block rates increased from 32% to 36%.[20] That is, during that ten-year period, declining-block rates went from being the most prevalent rate structure to being the least-used structure.

1. Declining-block rates

Declining-block rates are designed to recognize the efficiencies inherent in distributing a large quantity of water to a single customer. A typical declining-block rate might be structured as follows: \$4.00 per 1,000 gallons for the first 10,000 gallons per month; \$3.50 per 1,000 gallons for the next 50,000 gallons per month; and \$3.00 per 1,000 gallons for all water in excess of 60,000 gallons per month.

Most people would readily acknowledge, and most cost-of-service studies demonstrate, that it costs less to deliver five million gallons per month to one large customer than it does to deliver that same five million gallons to 1,000 residential customers. While the cost of treating and pumping the water may be the same for each gallon that leaves the treatment plant, the cost of building and maintaining the infrastructure to deliver the water will vary among customers. For example, a large customer might be connected directly to a single 10-inch transmission main, while serving 1,000 small customers from that same transmission main might require a distribution network of several miles of 6-inch water main, as well as 1,000 service lines and meters, numerous valves, and other infrastructure. Because most water rates include the recovery of fixed capital costs (such as water mains and treatment plants) as part of the variable (per-gallon) charge, the efficiencies in distributing water to large customers should be reflected in a lower rate per gallon.[21]

There is a perception, however, that declining-block rates discourage conservation or lead to inefficient consumption decisions by customers. That perception is legitimate when the consumption blocks are not designed properly or if the rates in each block do not reflect differences in the cost of serving large customers. As the AWWA states: "When properly designed, the declining block rate structure reflects the manner in which costs are incurred by the utility. It assesses costs associated with the usage patterns and demand requirements of the various classes of customers served."[22]

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[20] AWWA, *2006 Water and Wastewater Rate Survey* (Denver, CO, 2007), p. 7.

[21] One could debate the wisdom of including large amounts of fixed costs in a variable, per-gallon charge. The fixed costs of a water utility are so large (typically 90 percent or more of the cost of delivering a gallon of water to a customer), however, that any substantial movement away from including fixed costs in the variable charge would result in dramatic rate changes for most customers. In addition, moving toward a "true" variable charge would result in an incremental charge for water that is very low, which would be contrary to efforts by many utility commissions and environmental regulators to encourage water conservation.

[22] AWWA Manual M1, p. 91.

The key phrase in the quotation from AWWA is "when properly designed." Declining-block rates can be appropriate when a utility uses one rate schedule for customers with very different levels of consumption. Such diversity can exist if all customers are served on one rate schedule or if there is a very diverse customer class, such as a non-residential class that includes small shops and large industrial operations.

To determine how to reflect that diversity in a single rate structure, regulators must use a fully allocated cost-of-service study and a bill frequency analysis. The cost-of-service study is used to determine the difference in cost to serve customers of different sizes. While everyone might agree that it costs less to deliver five million gallons to one customer than it does to deliver that same amount of water to 1,000 small customers, there is no intuitive answer to the question "How much less does it cost?" To answer that question requires a cost-of-service study.

The bill frequency analysis provides the data to develop the break points between rate blocks. Typically, the first rate block should capture 75% or more of total consumption from the residential class (some rate structures are designed to capture 90% or more of residential consumption in the first block). The concept is that the first block should reflect the amount of water used by most residential customers. This ensures that a small customer does not see a decline in the price of water as consumption increases (which would be contrary to water conservation policies).

For utilities where there is great diversity within a class (for example, if the residential class includes single-family homes, apartment buildings, college dormitories, condominiums, and nursing homes), then meter sizes (which are a proxy for the size of a customer's water demand) might be used in addition to customer class definitions to determine the amount of water that should be included in the first block. For example, the first block could be designed to recover 75% to 90% of consumption by residential customers with 5/8-inch meters, which would capture usage by customers in single-family homes. If the residential class is homogenous (for example, containing only single-family houses of similar size), then the first block might include closer to 100% of residential consumption.

The price for consumption in the first block should be based on the cost-of-service study results for a typical residential customer. Generally, the price in the first block would include the recovery of base costs (that is, the average annual cost of producing and delivering a gallon of water) and peak demand costs for a residential customer.

For example, assume the following results from a cost-of-service study:

Table 1. Example of Base, Maximum Day, and Maximum Hour Costs and Demands

Cost component	Cost of service	1,000 gallons	Cost per 1,000 gallons
Base (average)	$18,000,000	3,600,000	$ 5.00
Maximum day	$ 3,500,000	5,040,000	$ 0.69
Maximum hour	$ 6,000,000	10,800,000	$ 0.56

Then assume the following usage characteristics for the residential customer class: maximum day equal to 2.5 times the average day and maximum hour of 4.5 times the average hour. The base-extra capacity method for conducting a water cost-of-service study would consider a maximum day of 2.5 times the average day to equal 1.0 times the average day plus *extra daily capacity* of 1.5 times the average day. Thus the maximum-day multiplier for the residential class would be 1.5. Similarly, a maximum hour of 4.5 times the annual average hour would consist of the average hour during maximum day (which is 2.5 times the average hour) plus *extra hourly capacity* of 2.0 times the average annual hour.

In gallons, these demands might appear as a typical residential customer using 180 gallons per day, on average, throughout the year. A peak day would see the typical customer using 450 gallons in one day. Those 450 gallons would consist of 180 gallons of average daily consumption and 270 gallons of peak-day consumption.

Similarly, the typical customer's average hourly demand throughout the year would be 7.5 gallons (180 gallons per day divided by 24 hours). During the maximum day, the customer's average hourly demand would be 18.75 gallons (450 gallons on the maximum day divided by 24 hours). And during the peak hour of the year, the customer would use 33.75 gallons (4.5 times the average hour of 7.5 gallons). Those 33.75 gallons would consist of 7.5 gallons of average-hour consumption, 11.25 gallons of maximum-day hourly consumption in excess of the annual average hour, and 15.00 gallons of maximum hour demand.

Using the information from this example, a cost-based rate for the first consumption block, based on the cost of serving most residential customers, would be $7.155 per 1,000 gallons, as shown in the following table.

Table 2. Determining First-Block Rate from Cost-of-Service Study Results

Cost component	System cost per 1,000 gallons (from Table 1)	Residential class multiplier	Residential cost (System cost x Multiplier)
Base (average)	$5.00	1.00	$5.000
Maximum day	$0.69	1.50	$1.035
Maximum hour	$0.56	2.00	$1.120
Total			$7.155

The same process would be followed to determine the cost-based rate in each succeeding rate block, using the customer class whose usage was predominantly included in that rate block. For example, if the second block were designed to include 80% of commercial consumption, then the commercial class's demand characteristics would be used to determine the price charged in that rate block.

The rates in the second and succeeding rate blocks may need to be adjusted slightly to ensure that costs are not over-recovered from larger customers. This over-recovery could occur because larger customers have already passed through the earlier rate blocks and, therefore, are purchasing some water at a higher cost than the average cost indicated by the cost-of-service study. This process is well recognized as developing declining-block rates that accurately reflect the cost of service, including the different usage characteristics of each customer class.[23]

In other words, the key to designing cost-based, declining-block rates is to ensure (1) that the rate blocks are designed to reflect the usage characteristics of the major customer classes, and (2) that the rate charged in each block is based on the demand characteristics of the predominant customer class in each rate block, using the results from a BECM cost-of-service study.

Unfortunately, this process of designing cost-based declining-block rates is frequently ignored. Utilities and commissions take short cuts, choosing "discounts" from one rate block to the next, or simply applying the same percentage increase to all blocks regardless of changes in the utility's actual costs. Over time, these approaches—which may have been reasonable approximations the first time they were used—can result in declining-block rates that no longer bear a reasonable relationship to the cost of service. That can result in customers and regulators becoming dissatisfied with declining-block rates as a rate structure. The fault lies not with the concept of declining-block rates, but with the failure to set the rates using the information gleaned from the cost-of-service study and bill frequency analysis.

In summary, declining-block rates are not an anachronism. When properly designed, they can continue to provide appropriate price signals to customers, reflect the cost of serving customers with different consumption patterns and demand characteristics, and meet Bonbright's standards of adequacy, efficiency, and fairness. Moreover, declining-block rates enable a utility to serve all customers on a single rate schedule, avoiding the need for the precise classification of customers (for example, is an apartment building residential or commercial?).

2. Uniform usage rates

When utilities move away from declining-block rates, the movement usually is to uniform usage rates, where all consumption is charged at the same rate per 1,000 gallons. More diverse utilities (those with very substantial differences in the average cost of delivering the same quantity of water to different customers, such as our earlier example of delivering five million gallons to one customer as opposed to 1,000 residential customers) may adopt separate uniform usage rates for each customer class. For example, all residential consumption will be billed at one rate (say $4.00 per 1,000 gallons) and all commercial consumption will be billed at another rate, with the commercial rate set lower than the residential rate (for example, $3.50 per 1,000 gallons), and so on.

When uniform rates are adopted for diverse customer classes (either one uniform rate for all customers or a customer-class rate for a very diverse class, as discussed above), the resulting rates will not reflect the lower per-unit cost to deliver water to large customers.

Moreover, when a utility moves from a rate schedule that applies to all customers (such as the declining-block rate schedule discussed above) to separate rate schedules for each customer class, the utility and regulators must ensure that the utility's classification of customers is accurate and reasonable. When all customers are served on the same rate schedule, the

[23] See generally, AWWA Manual M1, Chapter 11 and Appendix C.

customer's bill is based solely on the size of its meter and the amount of water it uses. Whether a customer is residential or commercial or public has no effect on the customer's bill or the utility's revenues.

But if the utility adopts separate rate schedules for each customer class, then the customer classification matters a great deal, affecting both the customer's bill and the utility's revenues. For example, a utility might classify privately owned apartment buildings as residential customers, but apartment buildings owned by a public housing authority (or dormitories owned by a public university) might be classified as public customers. Similarly, nursing homes that are owned privately (even if they are not-for-profit) might be considered residential customers, but the same type of facility owned by a county or other government agency might be classified as a public customer. The same types of classification problems can exist with schools, hospitals, condominiums, and other types of facilities that could be residential, commercial, or public depending on their ownership and the precise mix of uses (for instance, how much non-residential water use must a condominium have to be classified as commercial instead of residential?).

As an example, in 2007 the Kentucky Public Service Commission approved the following uniform class rates (per 1,000 gallons) for a large water utility:[24]

Residential	\$3.11706
Commercial	\$2.85067
Public	\$2.66001

A typical 50-unit apartment building might use 150,000 gallons per month. If the apartment building is classified as residential, it would pay \$468 per month. But if the utility classifies the apartment building as a commercial customer (for instance, because it has a convenience store in the lobby), the bill would be \$428. Further, if the apartment building is owned by a public housing authority, then the rate would be only \$399. It is difficult to justify this difference in charges solely because of the identity of the building's owner or the way in which a utility chooses to classify a particular building. Generally, differences in water rates should be based on differences in costs the utility incurs to serve different types of customers, not on characteristics of the customer that have no impact on the utility's cost of service. To address this challenge when moving to class-specific rates, some utilities and regulators find that it is necessary to create new customer classes, such as a separate class for multi-family buildings.[25]

[24] *Adjustment of Rates of Kentucky-American Water Company*, 261 PUR4th 470 (KY PSC 2007).

[25] See, e.g., *Application of Massanutten Public Service Corp.*, Hearing Examiner's Report, 2010 Va. PUC LEXIS 272 (Apr. 28, 2010); *Westwick Utilities Inc.: Notice of Intent to Establish Rates for Water Service for Apartments,* Docket No. 05-UN-280 (Miss. PSC, June 10, 2005); *Pa. Public Utility Comm'n v. United Water Pennsylvania Inc.,* 2010 Pa. PUC LEXIS 11 (Feb. 8, 2010).

Once customers are properly classified, developing uniform usage rates by class is fairly straightforward. In the cost-of-service study, base, extra capacity, and customer-related costs are assigned to each customer class by using the class's characteristics. After determining the revenue each class will generate from meter charges, the remaining revenue needed from each class is recovered by dividing the revenue by the class's total annual water consumption.

In summary, the challenge in developing uniform usage rates for each customer class is not in the mechanics of designing the rates themselves, but in ensuring that the appropriate customer classes are developed. Care must be taken to develop customer classes that have similar demand and consumption characteristics, so that similarly situated customers do not pay different rates. Commissions also must be careful to avoid developing customer classes that have customers of vastly different size, so that the rates reflect the lower per-unit cost of distributing a large volume of water to one customer.

3. Inclining-block rates

Inclining-block rates (also known as increasing-block rates, inverted rates, or conservation rates) contain at least two rate blocks with the rates increasing from one block to the next. The intent of this type of rate is to encourage customers to conserve water.

The first (lowest-priced) block should contain enough water to meet the indoor water use of a typical residential customer. For example, the California Public Utilities Commission has set the first block at a utility's "median water use … [which] approximates residential indoor use."[26] Similarly, the Nevada Public Utilities Commission has established the first block "based on the monthly inside-the-walls domestic use per customer, based on monthly statistics during off-peak winter months."[27]

Inclining-block rates can be cost-based rates when the utility faces increased marginal costs to meet peak water demands, or when the cost of adding water supplies in the foreseeable future is expected to be higher than the average embedded cost of existing supplies. In these instances (high peak costs or high avoidable costs), inclining-block rates can be justified if they charge a higher rate to the peak users or to customers whose consumption is growing (thereby driving the need for new capacity). The AWWA manual provides an example of designing a two-step inclining-block rate. In that example, the second block rate is calculated based on projected marginal operating and capital costs for new water supplies. The first-block rate is then calculated as the total revenue requirement minus customer charge revenues, minus second-block revenues, all divided by the amount of water consumption in the first block.[28]

Another approach to designing inclining-block rates is to assume that indoor residential consumption does not contribute significantly to system-wide peak demands, which is a

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[26] *Application of San Gabriel Valley Water Co.*, 2010 Cal. PUC LEXIS 98 (Apr. 8, 2010).

[27] *Application of Spring Creek Utilities Co.*, 2009 Nev. PUC LEXIS 26 (Mar. 19, 2009).

[28] AWWA Manual M1, p. 102.

reasonable assumption for many utilities. Thus, if consumption in the first block is limited to typical indoor residential consumption, then it may be reasonable to set the first-block charge equal to the base cost of water. All peaking costs then would be recovered through the second-block charge.

Unfortunately, inclining-block rates frequently are not designed to target peak demand or are not based on marginal cost. If the rates are not properly designed on a customer-class basis, inclining-block rates can result in customers with high *average* demands, and relatively modest *peaking* requirements, paying higher rates. This can result in customers who place *fewer* peak demands on the system, but who use larger amounts of water year-round, being required to pay more for water even though they are not causing increased system costs. For example, a restaurant or food processor that uses large amounts of water throughout the year and has little seasonal peak demand is not the "cause" of peak demands on the system, but is likely to pay significantly higher rates under inclining-block rates if the rates are not class-specific. Similarly, if the goal is to capture indoor residential consumption in the first block, care must be taken to ensure that the first-block consumption for multi-family buildings takes into account the number of residential units in the building. For example, if the first-block consumption limit is 3,000 gallons per month for a single-family residential customer, then the first-block consumption limit for a 20-unit apartment building should be 60,000 gallons per month (3,000 gallons per unit x 20 units).

While inclining-block rates are used throughout the United States, they are most prevalent in areas that are experiencing rapid growth, have a scarcity of water, or both. Inclining-block rates for investor-owned utilities are common in states like Arizona, California, Florida, and Nevada, but much less common in the Northeast and Midwest, where populations are growing slowly and water supplies tend to be plentiful.

Finally, regulators must ensure that a change to an inclining-block rate structure equity does not have unintended consequences. One such consequence can be significant rate increases for larger families and for some customers in rental housing. One study cautions:

> Water use by multifamily residential customers also is less responsive to price than water use by single-family customers. If multifamily housing tends to consist of lower-income customers, this finding has implications for affordability. Price changes will not induce significant reductions in use that could lower total water bills. … Changes in rate design to achieve conservation and other goals may have varying equity implications depending on the demographics of the service territory and the features of the rate structure.
>
> … Furthermore, poor households may not have the capital necessary for installing and maintaining conservation devices. Renters, in particular, may not be permitted to change plumbing fixtures or make other improvements.[29]

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[29] Janice A. Beecher, Thomas W. Chesnutt, and David M. Pekelney, *Socioeconomic Impacts of Water Conservation* AWWARF No. 90817 (Denver, CO 2001), pp. 49-50.

Indeed, because of these types of factors, the California Public Utilities Commission has issued the following caution about moving to inclining-block rates: "Before instituting increasing block rates, however, the Commission will carefully consider the impact on low income customers and may develop specific low income water rates …"[30] Policy-makers also might consider other approaches to alleviate these types of unintended consequences, such as modifications to plumbing codes or landlord-tenant laws.

In summary, inclining-block rates can be a useful tool for helping to encourage water conservation and avoid the construction of new water supply projects. Such rates should be designed based on differences in the cost of serving customers who contribute to the system's peak demands. Commissions also must be sensitive to the possible impacts of a change in rate structure on customers who differ from the "average," such as large commercial and industrial customers, renters, and large families.

[30] *Application of San Gabriel Valley Water Co.*, 2010 Cal. PUC LEXIS 98 (Apr. 8, 2010).

III. New Development in Water Rate Design: Customer-Specific Rates

During the past two decades, several municipally owned utilities, primarily in the western United States, have developed a new type of water rate, known variously as customer-specific rates, tailored rates, or water budgets.[31] The rate structure is an inclining-block rate in which the size of each block varies depending on the characteristics of each customer. The rates themselves are the same for all customers (for example, the block 1 rate is $4.00 per 1,000 gallons; the block 2 rate is $5.00 per 1,000 gallons; and the block 3 rate is $7.00 per 1,000 gallons), but the amount of consumption included in each block varies for each customer.

The first block is typically tied to a customer's necessary level of indoor consumption. The size of this block might depend on the size of the family, the type of commercial or industrial enterprise, the number of living units in an apartment building, or other similar factors.

The second block is an excess use block. Consumption in this block is designed to capture the customer's reasonable outdoor water consumption. The size of this block can vary by season; for example, a customer might be allowed to use more water in this block during the summer months than during other times of the year. The amount of water in the excess-use block can be based on arable land area, projected weather conditions, or other factors that recognize the need for some outdoor consumption. The charge for water used in the excess-use block would be higher than the first-block charge, with a goal of encouraging reductions in outdoor water use.

The third block often is a penalty block. Usage above the second block is considered to be wasteful based on reasonable water use given the customer's characteristics. In the water-short regions that have adopted customer-specific rates, this type of usage (it could represent, for example, a hose left running, an unfixed leak, or an uncontrolled sprinkler system) is strongly discouraged.

An investor-owned utility in California has adopted this type of rate structure for one of its service areas.[32] The customer-specific rates in that service area are determined by using 12 categories. Water budgets for commercial customers must be based on customer-specific audits conducted by the utility.

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[31] The process of designing these rates, including the extensive data required, as well as the advantages and disadvantages of this type of rate, are described in a study by Mayer and colleagues, as well as an earlier paper by Teodoro. Peter Mayer, et al., *Water Budgets and Rate Structures: Innovate Management Tools*, AWWARF No. 91205 (Denver, CO: 2008); Peter Mayer, et al., "Water Budgets and Rate Structures: Innovative Management Tools," *Journal AWWA*, 100:5:117-131 (May 2008); Manuel P. Teodoro, "Tailored Rates," *Journal AWWA*, 94:10:54-64 (Oct. 2002).

[32] See *California-American Water Co.*, 2006 Cal. PUC LEXIS 479 (Nov. 30, 2006).

The lawfulness of customer-specific rates for investor-owned utilities is, as yet, undetermined in most jurisdictions. Utility commissions usually are required to set rates that avoid "undue discrimination." This standard means that differences in rates must be based on differences in the cost of service or other relevant factors. Put simply, similarly situated customers should pay the same rates. It is unknown how commissions and courts would determine when customers are similarly situated. For example, under most rate structures, most residential customers are placed in the same class. The characteristic of providing utility service to a residential dwelling is what distinguishes those customers from the utility's other customers. Under customer-specific rates, that characteristic is no longer sufficient. Instead, the rates paid by a customer are based on another group of characteristics, such as family size, lot size, and so on. While it is possible that commissions and courts would determine that such a fine-tuning of customer classifications is reasonable, it also is possible that commissions or courts could find such classifications to be arbitrary, particularly if it cannot be demonstrated that the classifications are directly related to differences in the utility's cost of serving the customer.[33]

Customer-specific rates will be part of the rate-design landscape for many years to come, particularly in areas facing water shortages. Customer-specific water budgets can be an effective water conservation tool. It is anticipated that challenges will occur to the lawfulness, appropriateness, and cost basis of these rates. To avoid such challenges, commissions must ensure not only that the rate structure helps to meet conservation goals, but that the classifications used to determine customer-specific rates bear a reasonable relationship to the utility's cost of serving customers.

[33] In 2008, California enacted a law that specifically permits publicly owned utilities to establish customer-specific rates. Cal. Water Code §§ 370-374. See Mark Hildebrand, Sanjay Gaur, and Kelly J. Salt, "Water Conservation Made Legal: Water Budgets and California Law," *Journal AWWA*, 101:4:85-89 (Apr. 2009). The law does not apply to investor-owned utilities.

IV. Special-Purpose Water Rates

Parts I and II discussed the basic purpose of water rate design—recovering the utility's revenue requirement in a manner that is fair to all customers. Parts II and III explained that selecting the appropriate rate structure can help to implement important public policy goals, such as water conservation. This Part IV explores two other ways to implement public policy through water rates: rates to encourage (or preserve) economic development and rates to assist low-income customers.

A. Economic development rates (negotiated rates)

One important purpose of a public water supply is to enable a community's economy to develop and thrive. This development, of course, must be consistent with the community's land-use plans. Providing water infrastructure may not be sufficient to enable business to develop. The price of water service, especially during the start-up stages of a business, also can be important. Thus, some utility commission have approved special tariffs that enable a water utility to offer discounted water service to businesses that meet certain criteria.

For example, the Missouri Public Service Commission has approved an economic development tariff that enables a water utility "to encourage industrial and commercial development" in the utility's service area. The discounted rate is available only to the following types of businesses:

> New industrial or commercial customers moving to the Company's service territory from outside the state of Missouri or relocating or expanding from unsuitable facilities within Missouri, or the additional separately-metered facilities of an existing industrial or commercial customer, that meet the following criteria:
>
> 1) The annual load factor of the new or additional facilities must reasonably be projected to equal or exceed fifty-five percent (55%) during the entire term of application of this Rider. The projected annual customer load factor shall be determined using the following relationship: Projected Annual Water Consumption, Expressed as MGD [million gallons per day] Divided by Maximum Summer Monthly Billing Demand, Expressed as MGD.
>
> 2) The average annual billing demand of the new or additional facilities must be projected to be at least 0.5% of the total district consumption during each contract year under this Rider.

3) The customer's new or additional facilities must create new permanent jobs within the facilities qualifying for this Rider. The number of jobs created must be 0.1 % of the total population of the district's service territory, except that any location providing at least 50 jobs qualifies under this paragraph.[34]

For customers that meet these requirements, the Missouri economic development tariff provides rate discounts for five years: a 30% discount from the normal rate in the first year, with the discount declining by 5% each year until the customer pays the full tariffed rate in year six.

In special circumstances, however, even this discount may not be sufficient to attract a new customer. When that occurs, the utility may offer (subject to Commission approval) discounts that are larger or last for more than five years. In order to do so, the customer must "demonstrate a viable competitive alternative in another geographical area, which is critical to the customer's decision to locate new or expanding facilities in the Company's service territory." The customer also must "demonstrate that net benefits will accrue to the State of Missouri."[35]

Another approach to encouraging economic development has been used by the Pennsylvania Public Utility Commission. That commission has approved tariffs for water utilities that permit the utility to negotiate rates on a customer-specific basis, subject to Commission approval, for the purpose of either retaining or attracting large customers that will employ a significant number of people.[36]

Importantly, AWWA cautions that an economic development rate should be offered only if three criteria are met by the water utility and community:

- A comprehensive economic development plan. The plan should identify financial and economic benefits that the community is willing to offer targeted customers. It should also identify how subsidies will be met.

- A financially sound utility. The comprehensive economic development plan should address any threats to the financial integrity of the water utility.

- A long-term economic gain. The potential long-term economic gain to the community should be greater than any short-term subsidies provided.[37]

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[34] *Application of Missouri-American Water Co.*, 2008 Mo. PSC LEXIS 931 (Sept. 3, 2008), *3-4.

[35] *Id.*, at *5.

[36] *Pa. Pub. Util. Comm'n v. Pennsylvania-American Water Co.*, 1995 Pa. PUC LEXIS 170 (July 24, 1995), *95-96.

[37] AWWA Manual M1, pp. 139-140.

AWWA also warns that "in areas where water supply is extremely limited, it may not be appropriate to provide such concessions to a major water user" through an economic development rate.[38]

B. Rates for low-income customers

For at least the past two decades, water rates have been increasing faster than the rate of inflation and, in many jurisdictions, at a rate much faster than consumers' incomes.[39] As a consequence, some water utilities and their regulators have a segment of their customer base who find that water service at the fully tariffed price is not affordable.

While there are multiple reasons why water utilities cannot always collect the full amount billed to customers, customer affordability (that is, an inability to pay, as opposed to an unwillingness to pay) certainly is one factor. Thus, unaffordable water service affects not only low-income customers, but also utilities and their paying customers, who must bear the cost of both the unpaid bills and attempts to collect those bills. Indeed, one recent study summarized the problem for water utilities (and paying customers), as follows:

> The uncollectibles rate may be maintained at levels below 1% of a water utility's customer base *at any given point in time*. However … nationwide there are an estimated 10 million households with annual incomes below $20,000 (roughly equivalent to 125% of the Federal Poverty Level) that pay a water bill. This compares with a total 64 million households that pay water bills to community water systems. It is conceivable therefore that, *over time*, as much as 15% (10/64) of the customer base nationally might come into contact with a utility's bill collection practices. In some communities, the proportion can be much higher.[40]

Almost 20 years ago, the Pennsylvania Public Utility Commission explained that the affordability of water service was a relevant factor in determining whether a utility's rates are just and reasonable. That commission held:

> The question which the ALJ has put to us asks whether evidence of the general customer population, as it relates to the affordability of utility service, is relevant to setting rates. The short answer is "yes". … For well over a decade, this Commission has recognized that the issue of affordability is relevant to utility operations. For example, we have approved a number of special rates in order to promote economic development and to retain existing industries. Also, we routinely take customer's financial circumstances into consideration in dealing

[38] *Id.*, p. 143.

[39] AWWA, *Thinking Outside the Bill: A Utility Manager's Guide to Assisting Low-Income Water Customers* (Denver, CO: 2004), p. 6 (hereafter *"Thinking Outside the Bill"*); see also John E. Cromwell, III, et al., *Best Practices in Customer Payment Assistance Programs*, Water Research Foundation No. 4004 (Denver, CO: 2010), p. 30 (hereafter *"Best Practices"*).

[40] *Best Practices*, p. 25 (emphasis in original).

with individual inability-to-pay cases and in ordering the creation of Customer Assistance Programs. Clearly, affordability is commonly recognized as one of the possible inputs for our deliberations.[41]

There are a number of types of programs that can help address the affordability of water service.[42] One of those tools is a rate discount for low-income customers who meet certain qualifications. In recent years, several utility commissions have approved discounted rates for low-income water customers. Following is a sample of those rates:

- A discount off of the entire bill (e.g., 15%);[43]
- A percentage discount off of the service (meter) charge only (e.g., 50%);[44]
- A discount varying with household size (1 to 4 people, $8 per month; 5 to 8 people, $12 per month; more than 8 people, $16 per month);[45]
- A fixed dollar discount (e.g., $10 per month);[46]
- A "lifeline" rate that provides a certain quantity of water estimated for typical essential indoor water consumption (e.g., 2,000 gallons per month) to low-income customers at a discounted rate.[47]

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[41] *Pa. Pub. Util. Comm'n v. Pennsylvania Gas and Water Co.*, 1993 Pa. PUC LEXIS 134 (Mar. 8, 1993), *7-8.

[42] See, e.g., *Thinking Outside the Bill*; *Best Practices*; Margot Saunders, et al., *Water Affordability Programs*, AWWARF No. 90732 (Denver, CO: 1998); Water Environment Federation, *Affordability of Wastewater Service* (Alexandria, VA: 2007).

[43] *Application of Chaparral City Water Co.*, 2009 Ariz. PUC LEXIS 229 (Oct. 21, 2009).

[44] *Application of Arizona-American Water Co.*, 2008 Ariz. PUC LEXIS 109 (May 16, 2008); *Application of Valencia Water Co.*, 255 PUR4th 205 (Cal. PUC 2006); *Pa. Pub. Util. Comm'n v. Pennsylvania-American Water Co.*, 231 PUR4th 277 (Pa. PUC 2004).

[45] *Application of California-American Water Co.*, 2009 Cal. PUC LEXIS 346 (July 10, 2009).

[46] *Application of California Water Service Co.*, 2007 Cal. PUC LEXIS 368 (Apr. 12, 2007); *Portland Water District*, 2006 Me. PUC LEXIS 467 (Dec. 19, 2006); *Application of Mountain Water Co.*, 1997 Mont. PUC LEXIS 13 (Aug. 12, 1997).

[47] *Application of United Water Idaho Inc.*, 243 PUR4th 113 (Ida. PUC 2005).

In contrast, the Kentucky Public Service Commission has rejected a low-income water rate. The commission held that such a rate is not authorized for water utilities by Kentucky's public utility statute (there is a separate statute containing such an authorization for energy utilities).[48]

Frequently, low-income rates are the product of compromise or viewed only as a public policy decision. While the public policy—ensuring access to an essential public service—is an important one, low-income rates should have a cost-of-service basis, as well. Moving customers from non-paying or sporadically paying to regularly paying (but at a smaller amount) can reduce a utility's costs for customer service and collections. While there may not be a precise match between the foregone revenue and the cost savings, an appropriate analysis can provide a cost-based rationale for low-income rates. In addition, as Colton explains, as long as the low-income rate exceeds the variable cost of serving the customer, a contribution is being made to the utility's fixed costs, which benefits all other customers.[49]

C. Summary

In order to implement public policies, many commissions are authorized to adopt special rates for particular types of customers. Promoting the local economy and the affordability of utility service are important public goals, but regulators should not leave behind cost-of-service principles when attempting to implement those types of policies. When properly designed, rates that encourage customers to remain on the system, or that attract new customers, can help spread the utility's fixed costs over a large customer base, which can provide a benefit to all customers. Similarly, rate discounts that improve the collection of bills, thereby reducing collection costs and working capital requirements, also can benefit all customers if properly designed and implemented.

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[48] *Kentucky-American Water Co.*, 2005 Ky. PUC LEXIS 192 (Feb. 28, 2005).

[49] Roger D. Colton, A Cost-Based Response to Low-Income Energy Problems, *Public Utilities Fortnightly*, 127:5:31-35 (Mar. 1, 1991), p. 35. See also *Best Practices*, pp. 49-52.

V. Automatic Rate Adjustments

A. Introduction

The ratemaking process involves a matching of revenues, expenses, investment, return, customers, and consumption. Automatic rate adjustments for single expense items break this relationship.

The matching principle involves a synchronous examination of the cost of service and sources of revenue, as well other considerations such as the quality of service and efficiency of management. That synchronization is the reason why a test year is used when a rate case is filed. One treatise on utility regulation discusses this synchronization, or the matching principle, as follows:

> If the utility proposes a change, particularly a major change, in the test year rate base, it is required also to consider the related changes in other costs or in revenue. Additional investments may result in efficiencies that reduce operating costs or quality improvements that will increase sales. Unless the utility shows that it has taken such matters into account, its revenue requirement is likely to be out of balance or overstated.[50]

For example, under normal circumstances, when a utility replaces an aging piece of equipment, it might increase rate base and depreciation expense, but it also could reduce maintenance expenses or produce other cost savings (such as reducing losses). To keep costs synchronized might require adjustments to rate base, depreciation expense, expenses, working capital, and taxes.

The use of automatic rate adjustment mechanisms only for certain aspects of the Company's revenue requirement violates the matching principle, disrupting the relationship between utility rates and levels of cost and investment.

As a general rule, therefore, automatic rate adjustments should be used, if at all, only for significant volatile expenses largely outside the utility's control. A good example of this is a surcharge to recover state or local revenue taxes or franchise taxes that are imposed on the utility.[51] For example, the Arizona Corporation Commission has canceled a water utility's purchased water and power surcharges because the costs were not sufficiently volatile, stating: "Adjustment mechanisms should … be used only in extraordinary circumstances to mitigate the effect of uncontrollable price volatility or uncertainty in the marketplace."[52]

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[50] Goodman, vol. II, p. 735.

[51] See, e.g., 220 Ill. Comp. Stat. § 5/9-221; 66 Pa. Cons. Stat. § 1307(g.1).

[52] *Application of Arizona Water Co.*, 247 PUR4th 304 (Ariz. CC 2005).

Before deciding to use a surcharge, commissions should consider two additional factors. First, is the cost related to other expenditures that are not subject to the adjustment mechanism (that is, are there trade-offs)? Second, is the cost large enough to justify making periodic changes in customers' bills?

A simple example illustrates the trade-off concern. Assume that a utility has an automatic rate adjustment to recover its postage expenses for sending bills to customers. A utility could increase or decrease its postage costs by changing the manner in which it provides other billing options to customers, such as electronic billing. If a utility eliminated its electronic billing operations, it would greatly increase its postage expenses while saving substantial computer-related and payment-processing costs. The increase in postage costs would be recovered automatically through the hypothetical postage adjustment tariff, but the utility would retain all of the cost savings from reduced computer expenses. Similarly, such an adjustment mechanism would provide a disincentive for the utility to enhance its use of electronic billing, which might result in overall cost savings. The utility would be unable to recover the additional costs of online processing, but it would be required to pass through the savings in postage expenses.

In other words, adopting an automatic rate adjustment can skew the normal evaluation of investments in new technologies or processes that might improve efficiency and save costs in the long term. If one aspect of the cost or savings is passed through to customers automatically but another aspect is not, then the utility's investment decisions may be changed solely because of the ratemaking construct that was put in place. It is important, therefore, to ensure that any automatic rate adjustment does not affect an area in which the utility will be making investment or other decisions that could result in trade-offs not fully captured by the rate adjustment mechanism.

The second additional concern is that the expenditure involved should be large enough to justify the regulatory compliance costs that will be incurred by utilities, regulators, public advocates, and other customers. For example, in New Jersey water utilities are permitted to use a purchased water adjustment tariff only if purchased water costs exceed 10 percent of the utility's operating and maintenance expenses.[53] In Delaware, a water utility is permitted to request a change in purchased water or electricity costs only if the change from the amount determined in the most recent base rate case is more than three percent (and the rate case must have been completed within the last 18 months).[54]

Because single-issue surcharges are an exception to typical ratemaking procedures, specific types of surcharges often require statutory authorization. For example, a Pennsylvania court overturned the use of a system investment surcharge for wastewater utilities because a statute only authorized such a surcharge for water utilities.[55] Even where a special statute is not

[53] N.J. Admin. Code § 14:9-7.1.

[54] Code of Dela. Regs. 26-1000-1002 Part G.

[55] *Popowsky v. Pa. Pub. Util. Comm'n*, 869 A.2d 1144 (Pa. Cmwlth Ct. 2005), appeal denied, 586 Pa. 761, 895 A.2d 552 (2006).

required, commissions may delineate acceptable types of surcharges through regulations or policy statements of general application to a utility industry rather than addressing such issues on a case-by-case basis.

Two types of surcharges have received particular attention in the water industry: (1) distribution system investment and (2) purchased water and/or electricity expenses.

B. Distribution system investment

A distribution system investment surcharge permits a rate adjustment for the recovery of a return of and return on non-revenue-producing investments in the water distribution system (typically, water mains, valves, service lines, and fire hydrants). For example, an Illinois statute authorizes a surcharge for the "return on the investment in and depreciation expense related to plant items or facilities (including, but not limited to, replacement mains, meters, services, and hydrants) which (i) are not reflected in the rate base used to establish the utility's base rates and (ii) are non-revenue producing."[56] That statute then defines "non-revenue producing" as a facility "that is not constructed or installed for the purpose of serving a new customer."[57]

This type of surcharge is often capped at a certain percentage of the utility's total revenues, such that when investments exceed the cap, the utility must file a base rate case to recover any additional costs. For example, Pennsylvania and West Virginia cap such surcharges at 7.5% of a water utility's revenues,[58] while Illinois has a cap of 5% of revenues.[59]

C. Purchased water and/or energy expenses

By statute, regulation, or policy, several state commissions permit water utilities to adjust rates through a surcharge for changes in the cost of purchasing water and/or electricity from other utilities (including municipal utilities). As discussed in Part V.A. above, the commission may require that these costs reach some threshold level (typically a certain percentage of operating and maintenance expenses) before the surcharge can be used.[60]

A purchased water surcharge also may include a cap on the percentage of lost or unaccounted-for water ("LUFW") that can be recovered from customers through the surcharge. For example, the Florida Public Service Commission has limited the recovery of LUFW to

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[56] 220 Ill. Comp. Stat. § 5/9-220.2.

[57] *Id.*

[58] *Petition of Pennsylvania-American Water Co.*, 2007 Pa. PUC LEXIS 42 (Aug. 14, 2007); *West Virginia-American Water Co.*, 2010 W. Va. PUC LEXIS 330 (Feb. 12, 2010).

[59] 83 Ill. Adm. Code § 656.30.

[60] See, e.g., N.J. Admin. Code § 14:9-7.1; Code of Dela. Regs. 26-1000-1002 Part G.

10%,[61] the New York Public Service Commission has used a LUFW limit of 18%,[62] and the Illinois Commerce Commission has established limits based on utility-specific factors (generally LUFW between 12% and 14%).[63]

Regulators also impose additional conditions on the use of purchased water and/or electricity surcharges. For example, the surcharge may be available only to small water utilities,[64] the utility may be required to contest actively (or otherwise negotiate regarding) rate increases proposed by its supplier,[65] the surcharge may be available only to utilities in sound financial condition that have had a recent base-rate review,[66] the surcharge may not be available if the supplier is an affiliate of the utility,[67] or the surcharge may be used only for changes in the supplier's rates and not for changes in consumption.[68]

In other words, several state commissions have authorized the recovery of purchased water and/or energy costs through a surcharge. Such authorizations often come with restrictions or other limits to ensure that the utility exercises prudent purchasing practices and that the surcharge process does not become a substitute for base rate reviews.

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[61] See, e.g., *Aloha Utilities, Inc.*, 1982 Fla. PUC LEXIS 825, 82 Fl. PSC 29 (Mar. 3, 1982).

[62] See, e.g., *United Water New Rochelle Inc.*, 2002 N.Y. PUC LEXIS 332 (July 29, 2002).

[63] See, e.g., *Citizens Utilities Co. of Illinois*, 1993 Ill. PUC LEXIS 464 (Nov. 23, 1993); *Citizens Utilities Co. of Illinois*, 1992 Ill. PUC LEXIS 331 (Aug. 26, 1992).

[64] 52 Pa. Code § 53.54(c) (Pa. PUC limits use to utilities with annual revenues less than $250,000).

[65] *Gordon's Corner Water Co.*, 2006 N.J. PUC LEXIS 166 (Aug. 18, 2006).

[66] Code of R.I. Rules 90-060-001(2.10).

[67] 30 Tex. Admin. Code § 291.21(h)(6).

[68] 170 Ind. Admin. Code § 6-5-4.

Conclusion

Even in the face of new challenges, Bonbright's primary rate design principles of adequacy, efficiency, and fairness continue to be relevant to utility commissions today. In order to implement those principles, regulators must focus on three essential sets of facts: the detailed elements of a cost-of-service study, information about customer consumption gleaned from a bill-frequency analysis, and data about the utility's demand patterns. These factors remain of paramount importance, even when regulators elect to use water rates to implement other important public policy goals such as conservation, economic development, and affordability. Indeed, assuring that those goals are implemented in a manner that is fair to the utility and its customers requires an understanding of the same essential sets of facts.