

# Water Rate Analysis

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A Logical Approach to Establishing Rates

Prepared by



**THE SHPIGLER GROUP**  
STRATEGY MANAGEMENT CONSULTING SERVICES

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## Executive Summary

Rate analysis is one of the most important and yet least understood aspects of water and wastewater utility operation. The development of the right rate structure can help a utility ensure that its financial obligations are met, customers are charged at fair and equitable rates, and stakeholder interests are in full alignment. However, too many water and wastewater utilities struggle to arrive at the appropriate rate design.

The good news is that there is a well-established process for rate design among water utilities. Historically, the process involves three key steps:

- Revenue Requirement – the revenues of the water system are compared to the cost structure to determine the adequacy of rates to cover costs
- Cost Allocation – allocating the revenue classes according to customer classes in order to ensure proper allocation
- Rate Design – blending the elements of revenue requirements and cost allocation to develop the appropriate rate structures for each class of service that achieve the goals of the organization and community

Our experience suggests that there is a prior step that needs to be implemented – a complete review of system operations to provide the necessary inventory of costs and revenue drivers and guidance for all subsequent steps. Adding this step helps streamline the process and make the entire effort go much more quickly, smoothly, and accurately. In this white paper, we review the recommended approach to rate design for utilities of all sizes.

## Rate Setting Approach

Water utilities are challenged to establish fair and equitable rates that properly reflect the costs of operating a water utility. According to the M1 manual established by the AWWA,

*“Establishing cost-based rates, fees, and charges is an important component in a well-managed and operated water utility. Cost-based rates provide sufficient funding to allow communities to build, operate, maintain, and reinvest in the water system that provides the community with safe and reliable drinking water and fire protection. Properly and adequately funded water systems also allow for the economic development and sustainability of the local community.”<sup>1</sup>*

Every utility aims to design a rate structure that generates sufficient revenue to support the delivery of high quality service, is consistent with industry practices, and is responsive to utility and stakeholder objectives. Stakeholders may include:

- Customers
- Policy makers
- Suppliers
- Regulators
- Rating agencies
- Industry
- Lenders
- Employees

While the overall process of rate design has seemed complicated to many over the years, there are a number of fundamental principles involved in the establishment of appropriate rates<sup>2</sup>:

- Effectiveness in yielding total revenue requirements (full cost recovery)
- Revenue stability and predictability
- Stability and predictability of the rates themselves from unexpected or adverse changes
- Promotion of efficient resource use (conservation and efficient use)
- Fairness in the apportionment of total costs of service among the different ratepayers
- Avoidance of undue discrimination (subsidies) within the rates
- Dynamic efficiency in responding to changing supply-and-demand patterns
- Freedom from controversies as to proper interpretation of the rates
- Simple and easy to understand
- Simple to administer
- Legal and defensible

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<sup>1</sup> “Water Rates, Fees, and Charges”, AWWA Manual M1, 7<sup>th</sup> Edition.

<sup>2</sup> Bonbright, J.C., Daniels, A.L., Kamerschen, D.R. “Principles of Public Utility Rates, 2<sup>nd</sup> ed.”, Public Utilities Reports, 1988.

In order to achieve these goals, the AWWA recommends a three stage process, involving revenue requirement analysis, cost-of-service analysis, and rate design analysis. However, from experience, our firm has found that the development of an initial step actually helps the process run more smoothly:



The four steps involve the following elements:

- System Operations – an initial inventory of current and forecasted capital and operational expenses, alongside forecasted demand for service help to serve as the foundation for rate analysis
- Revenue Requirement – the revenues of the water system are compared to the cost structure to determine the adequacy of rates to cover costs
- Cost Allocation – allocating the revenue classes according to customer classes in order to ensure proper allocation
- Rate Design – blending the elements of revenue requirements and cost allocation to develop the appropriate rate structures for each class of service that achieve the goals of the organization and community

## System Operations

While the first step of rate setting normally involves a focus on revenue requirements, prudent water utility managers recognize the need to first develop a comprehensive assessment of the underlying conditions that drive the utility's performance. Ultimately, these values will serve as the foundation for a more accurate assessment of revenue requirements, cost allocation, and rate design. Without first establishing the foundation for system operational characteristics, a utility runs the risk of needing to adjust rates sooner rather than later.

Some of the key aspects of operational assessment include:

- Revenue Drivers
  - Customer Counts – What is the forecasted growth in the number of customers served over time? Do growth rates differ among customer classes (e.g. residential, commercial, industrial, irrigation, municipal use)?
  - Changes – Are there any potential new water usage trends that are expected in the foreseeable future?
  - Volume – What are the trends for water usage by class over time?
- Operational Expense Drivers
  - Professional Services – How is the system being managed? Are there expenses associated with third party contracts that need to be accounted for?
  - Operating Services and Supplies – Are there expected changes to the cost structure for supplies? Will any new services be needed in the future?
  - Staffing – Are any changes in staffing levels expected? Is the system under- or over-resourced today? Are there retirements that need to be accounted for?
  - Financial – Are there any municipal transfers that need to be accounted for? Is there debt service that needs to be addressed? Are there any expected changes to non-cash charges like amortization and depreciation?
- Capital Expense Drivers
  - Infrastructure – Is there a need for any system upgrades or improvements? Are there any plans for any automation systems (e.g. automated leak detection, asset management, water quality monitoring) that would increase capital expense while reducing operating expense?
  - Appropriation – Are there any joint projects that need to be accounted for in conjunction with other municipal departments (e.g. public works, electric department)?
  - Financing – Are there any grants available for any planned programs? Can any debt be refinanced?

In addition, there are a number of rate policy issues that should be addressed up front. Thinking about the issues that generally impact revenue and cost drivers will also lead to the development of some general philosophies concerning rate policy.

- What are the general principles associated with financial sufficiency of the utility?
- What considerations must be given to ensure equitable treatment of customers?
- How can rates be established to provide for a stable revenue stream over time?
- How can the utility establish rates that are easily understood by customers and align interests?
- Are there any operational issues that challenge the ability of the utility to affordably deliver water services?
- How can rates be used to align with community economic development goals?
- Is there a need for conservation that should be taken into account?

In our experience, it is prudent for a water utility to engage in an effort to address these kinds of questions prior to immediately launching into the revenue requirements phase. By doing so, the utility will have a more accurate sense of the drivers of forecasted revenues and costs. In turn, this results in a more accurate view of the needs for the rate planning process and a more sustainable rate structure.

## Revenue Requirements

The revenue requirements phase represents the first major milestone in conducting a comprehensive rate analysis. According to the AWWA,

*“The purpose of the revenue requirement analysis is to determine the adequate and appropriate funding of the utility. Revenue requirements are the summation of the operation, maintenance, and capital costs that a utility must recover during the time period for which the rates will be in place.”<sup>3</sup>*

This process ensures that revenues are sufficient to cover all operation and maintenance expenses, capital expenses, debt service, and reserves for development and perpetuation of the system while ensuring that the utility’s financial integrity is maintained. Performing this analysis must be undertaken carefully, and there are a number of issues that must be considered:

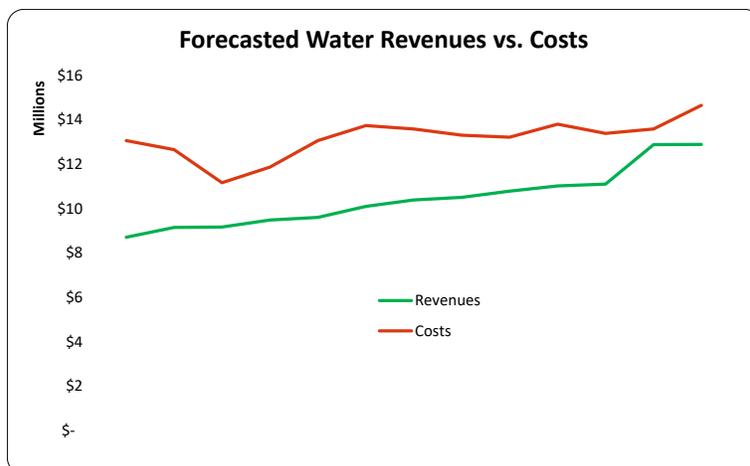
- What is the base year for the financial projections used in the revenue requirements analysis?
- Over what time period will the projection be made?
- Will the forecasts be made under an accrual or cash basis?
- How much is needed for reserves?
- What are the debt levels and how will they be financed?
- How will new capital projects be financed?

One of the biggest challenges for any utility involves the choice of how to forecast costs into the future given a set of unknown factors. Some utilities deal with this issue by choosing the budgeted or forecasted year and making some calculation of expected growth or escalation over time. Other utilities will utilize a recent year that represents a “typical” cost level for the utility as the baseline. Our feeling is that the best forecast is the one that offers the most likely scenario for the future by combining elements of a historic base year while making adjustments for expected changes in the future, otherwise known as a pro forma projection.

As the first formal step in the rate setting approach, the revenue requirements analysis offers the utility an early glimpse into potential problems that would result in economic shortfalls. Consider the following case of a water utility that found itself in a difficult situation:

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<sup>3</sup> “Water Rates, Fees, and Charges”, AWWA Manual M1, 7<sup>th</sup> Edition.



Clearly, this utility finds itself in a situation where its rates are not sustaining its financial obligations. In this case, the gap between revenues and costs were caused by a number of factors:

- Rates had not been adjusted in many years, resulting in a woefully out-of-date rate structure that no longer aligned with the community's needs
- Rates were heavily driven by charges from a residential segment that was largely economically challenged and not properly allocated to a significant water demand drawn from its industrial base
- Debts for municipal projects had been placed on the books of the water utility while the utility did not reap benefits from those financial obligations
- No recent accounting had been conducted to reveal the fact that water revenues needed to be supplemented by the municipal general fund
- Rate structures were misaligned with water costs and conservation goals

By highlighting the nature of the deficit spending within the revenue requirements analysis, this utility now has made the first step in fixing its situation through an updated rate structure. For many utilities, this first step can be a challenge, due to a number of factors:

- Cost detail that is insufficient for proper analysis
- Capital plans that are incomplete or do not account for a realistic scenario of future system needs
- Inconsistent capital financing policies
- Unclear financial objectives and policies to provide guidance for the overall rate setting process

## Cost Allocation

Cost of service represents the total annual revenue requirements that must be generated from utility revenues. In effect, there is a recognition that the cost of providing service must be recovered from those same customers. According to the AWWA,

*“The purpose of the cost-of-service analysis is to equitably distribute the revenue requirements between the various customer classes of service served by the utility. The cost-of-service analysis determines what cost differences, if any, exist between serving the various customer classes. The two generally accepted methodologies for conducting the cost-of-service analysis are called the base-extra capacity method and the commodity-demand method. The functionalization, allocation, and distribution process of the base-extra capacity and commodity-demand methodologies are generally considered fair and equitable because both approaches result in the revenue requirements being distributed to each class in proportion to each class’s contribution to the system cost components.”<sup>4</sup>*

One of the challenges associated with accounting in this field involves the treatment of cost allocations. For example, single rate cost allocation effectively creates a single cost rate that does not distinguish between fixed and variable costs. By contrast, specific cost analysis involves more precise allocations that recognizes the differences between cost elements – and the cost drivers for each. This is a key principle to keep in mind for a number of factors:

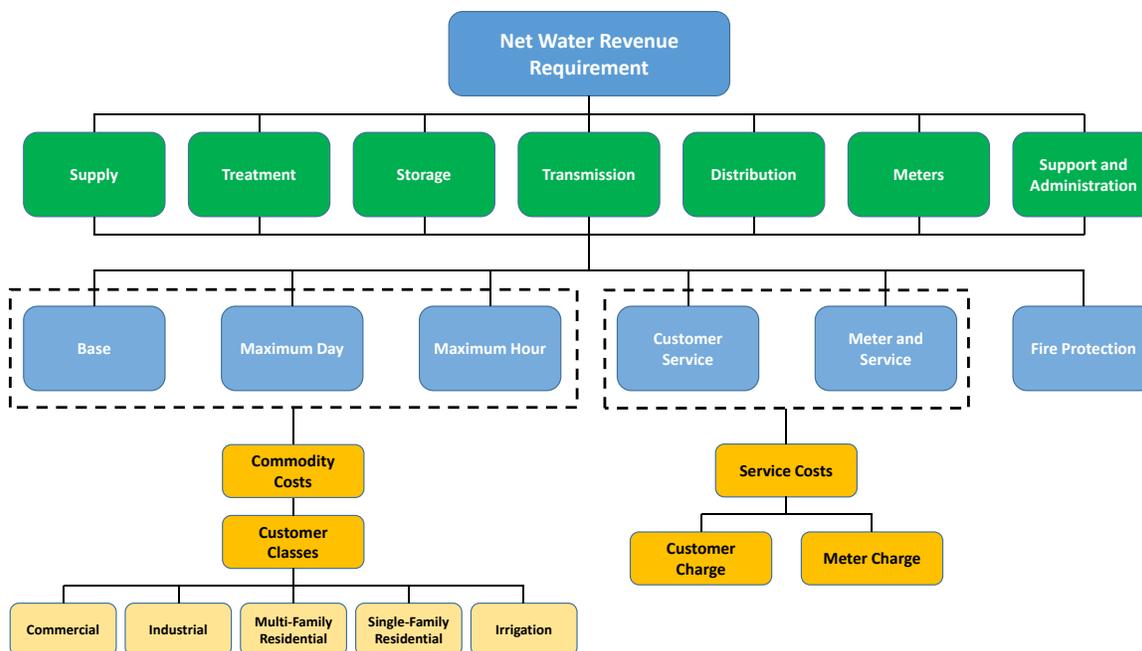
- Different classes of customers may generate costs in different ways because of the differences within their usage patterns
- The cost of service must address the need to match costs associated with serving different classes of customers
- Ultimately, it is critical to ensure that the ultimate rate design allows all customers to “pay their own way”

The simplest way of ensuring proper cost allocation involves the principles of equity in which costs are recovered from users in proportion to their use of the system as well as recognizing the impact that each customer class has on the maintenance and operation of the overall system. However, this may be easier said than done in cases where utility operations are large and complex. Consider the following graphic depicting the logical breakdown of cost structure for a large water system<sup>5</sup>:

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<sup>4</sup> “Water Rates, Fees, and Charges”, AWWA Manual M1, 7<sup>th</sup> Edition.

<sup>5</sup> Principles of Water and Wastewater Rate Setting, San Antonio Water System.



While the graphic above appears to be very complex, the basic principles of cost of service analysis apply and support a fairly straightforward approach. The key elements of this endeavor include:

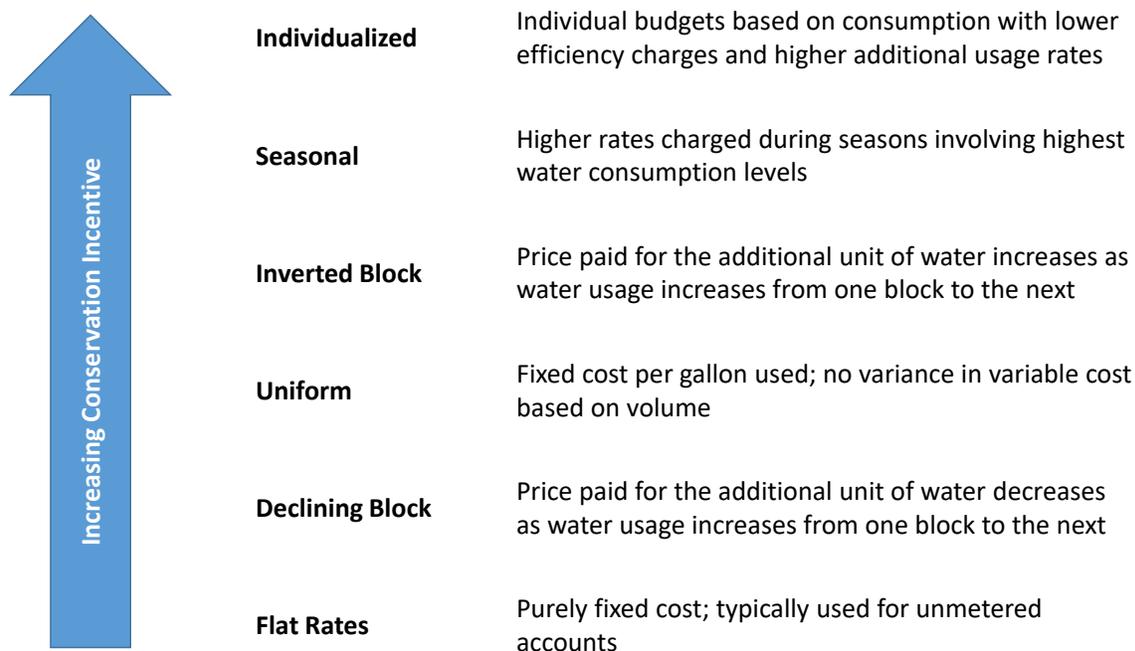
- Categorizing costs by function so that they can easily be identified
- Allocating cost elements to the appropriate customer classes
- Developing unit costs based on cost drivers like base-extra capacity and commodity demand

## Rate Design

The final step in the process is the establishment of rates through a rigorous rate-design analysis. This analysis determines how the utility can effectively recover the appropriate level of costs from each customer class of service. Regardless of the structures implemented, there are some key elements to consider, the first of which involves the use of fixed and variable charges.

A poll indicated that 96% of water utilities use some kind of fixed charge alongside variable (consumption) charges.<sup>6</sup> The fixed charges are set regardless of the customer's water usage and typically cover customer-related costs. Examples of fixed charges include customer charges to cover account charges (e.g. billing, collection), service and/or capacity charges by meter size, and minimum charges. By contrast, variable costs vary with the amount of water used by customers and provide coverage of the water production, treatment, and delivery as well as a pro rate share of utility fixed costs. In addition, it is very common for wastewater consumption charges to be derived from water consumption.

For the overwhelming majority of water systems, rate structures emphasize variable charges. This is of particular importance when it comes to water conservation – an issue that more and more water utilities are promoting. In effect, water utilities can help create incentives to participate in conservation based on structure. Some common structures include:



<sup>6</sup> RFC/AWWA 2006 Rate Survey Data.

## Summary

There are no set rate structures that work in all cases. Each utility must determine its own approach given the realities of organizational/community goals and operating characteristics of the water distribution network. Some of the considerations that utilities must account for in rate setting include:

- Are there any potential risks or shocks to the forecasted revenue stream that should be accounted for?
- Do the current grouping of customer classes properly account for the different needs of the community served?
- When changing rate structures, what are the impacts to customer bills, in particular the economically disadvantaged?
- How do proposed rate structures align with nearby communities? If there are significant differences, what are the reasons for them?
- If significant rate increases have been proposed, are there opportunities to phase in the increases in order to mitigate the impacts to customers?
- Along with changes to rate structures, is there a need to change the bill frequency?
- Do water rates for commercial and industrial classes support the development of economic development opportunities for the community?
- What is the local elasticity of demand for water that drives the change in consumption when rates are updated?

One key issue for utilities to keep in mind is that the move to utilize rates to drive consumption patterns does not end once rates are updated. It is critical for utilities to engage with customers so that changes in rate structures and incentive programs are properly communicated and understood by customers. Some best practices in this respect include:

- Increased frequency in billing offers utilities more opportunities to communicate rates so that customers can become more responsive to price signals
- Including pricing and usage details on bills enables customers to be more educated
- Sub-metering on multi-tenant and multi-dwelling units provides greater incentives for customers to engage in conservation and leak repair efforts

Ultimately, the development of a proper rate structure can help water (and wastewater) utilities on a number of fronts. With a proper rate design in place, a utility can ensure that customer incentives and utility goals are aligned. Revenue stability can be supported while accounting for reserve requirements. In addition, any utility can support the goals of providing for an economically viable entity that supports community objectives. While the steps involved in proper rate setting may seem complicated, a proper approach can easily streamline the effort and the results can be very worthwhile.