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From: Shawn Koorn, HDR
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Subject: Review of General Service Consumption Rate Structures

Introduction

HDR Engineering, Inc. (HDR) was retained by Seattle Public Utilities (SPU) to assist in the review its retail water cost allocation as well as the water and wastewater rate structures. HDR previously provided to SPU a technical memorandum and presentation reviewing the water rate structures. At the conclusion of the review, SPU requested additional information on the applicability and appropriateness of tiered (increasing block) rates for general service customers.

Overview of Consumption Based Rate Structures

As discussed in our earlier technical review of the water rate structures, there are four basic rate structures for consumption based charges; a uniform charge, a declining block charge, inverted (increasing or tiered) block charge, and seasonal. Under a uniform rate structure, the cost per unit does not change with consumption. The uniform structure is a simple and straightforward approach from the perspective of customer understanding and rate administration/billing. In contrast, the declining block rate structure is a bit more complex. The number of blocks (e.g., 3 stepped blocks) and size of the blocks (e.g., 0 – 10,000 gallons) may vary. However, the number of *blocks*¹ should be reasonable (i.e. 2 – 5 blocks) for reasons of simplicity and administration. Declining block rates may imply that there are certain economies of scale with additional consumption, or improved capacity use, and the declining price is not necessarily a “volume discount.” Depending upon the specific utility, this may or may not be a true statement. An inverted (increasing or tiered) block rate structure attempts to send a price signal to consumers that their consumption costs more, as more water is consumed. Again, this may or may not be the proper price signal regarding the specific utility’s water resource costs. Finally, a seasonal rate structure is a form of a time-differentiated rate structure. Under a seasonal rate structure, water consumed in the summer is priced at a higher level than winter water consumption. This structure attempts to reflect the difference in costs associated with usage during a peak period when water supply resources may be constrained.

¹ “Blocks” or “Consumption Blocks” is used in a declining block or inverted block rate structure and refers to the amount of consumption allowed before the price changes to a succeeding price block. The initial block refers to the first price block (e.g. 0 to 5,000 gallons). The tail block refers to the last price block (e.g. all usage over 5,000 gallons).

Overview of Tiered Rate Structures

As noted above, there are two (2) primary components when establishing a tiered rate structure; the number of tiers, and the size of the tiers. In HDR's experience, research, and in reviewing water industry rate surveys, tiered rate structures typically have 2 to 4 pricing tiers. The purpose of establishing the tier size and pricing is to provide a price incentive to reduce, or maintain, consumption at certain levels. Over the at least the last 15 years, tiered rate structures have primarily been established to help meet conservation goals by providing a "price signal" for efficient and inefficient/wasteful use.

Tiered rate structures are best suited for customer classes of service with relatively homogenous (similar) usage patterns. Typically, the tier sizes are based on the average consumption patterns of the customer class. For a residential customer class of service this works well in that the first tier can be based on average indoor use, with subsequent tiers being based on average outdoor use and greater than average outdoor use. Other utilities may set the first tier based on policy objectives such as a lifeline rate or essential needs basis. Regardless of the approach, the goal of the tiers is to provide a sufficient amount of consumption in the tier to reflect the basis for the costs associated with providing that level of consumption.

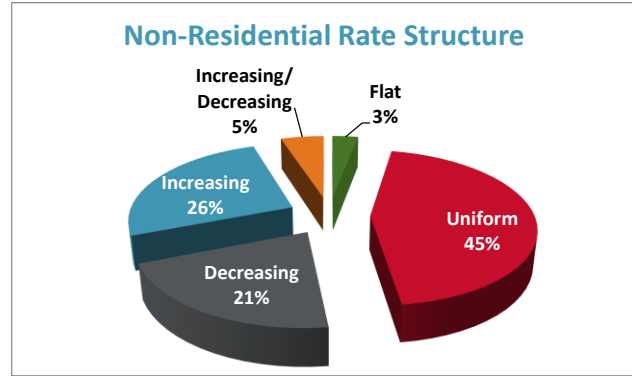
Given an understanding of how the tier sizes are typically established, the focus shift to the pricing of the tiers. Technically, the pricing of each tier should be based on the costs associated with providing the consumption at the various tiers. Through a cost of service analysis, the tier pricing can be established. The purpose of the tiered (increased) pricing is to reflect the additional costs placed on the system by the customer as consumption increases. Typically, the additional cost reflects the added or incremental capacity needed by the system to meet the increased demands (consumption). In this manner, customers that use more water create greater demands and costs on the system. A water supply and distribution system must be sized to meet these peak use requirements. In other words, on the hottest day of the year when everyone is watering their lawn, the supply and distribution system must be sized to meet those peak use demands. Economic theory clearly states that equity is achieved when those that create the demand event, pay for the demand event. In this particular case, this has implications upon the equitable allocation of capacity-related costs to the different usage tiers (low use vs. high peak use). In this manner, the pricing can be developed to reflect those costs incurred to meet the increased demands (consumptive use).

There are other possible cost-drivers that can be used to establish the cost-basis for tiered rates. Constrained water resources or multiple water supplies is a clear example of another possible cost-driver for a tiered rat structure.

General Service Water Rate Structures

As noted in the prior technical memorandum reviewing water rate structures, there are various consumption rate structures utilities utilize for general service customers (i.e., multi-family, commercial). As noted in the American Water works Association, (AWWA) 2012 Water and Wastewater Rate Survey the primary rate structure for non-residential customers is a uniform

consumption rate. This is followed by an increasing and decreasing block rate structures. Combined, these three rate structures make up 92% of the responses in the 2012 survey.



HDR also reviewed other regional water utilities, as well as other similar utilities across the U.S. In total, 45 utilities were reviewed to gain a better understanding of the rate structures utilized for general service type customers. Of the sample of utilities reviewed, approximately 42% (19 utilities out of 45) had tiered rate structures for the general service customers. The remaining utilities (58%) use a uniform rate structure. This is very similar to the results of the AWWA 2012 Water and Wastewater Rate Survey. It should be noted, that the review included multi-family customers since SPU classifies multi-family as a general service customer. It is also important to note that a seasonal rate structure was “counted” as a tiered rate structure for purposes of this discussion. Provided in the Table below is a summary of the regional and national utilities with a tiered consumption rate structure for general service customers.

Summary of the Consumption Charge for Commercial and Multi-Family			
Utility	Tier Size	# of Tiers	Notes
Regional Utilities			
Water District 20	Fixed	2	<i>Applies to all customers</i>
Water District 45	Fixed	3	<i>Applies to all customers</i>
Water District 119	Fixed	4	<i>Seasonal pricing</i>
Duvall	Fixed	5	
Kent	Fixed	2	<i>Seasonal pricing</i>
Cedar River	Fixed	3	<i>Applies to all customers</i>
Soos Creek	Fixed	4	<i>Applies to all customers</i>
Spokane	Fixed	4	<i>Applies to all customers</i>
Highline	Fixed	2	<i>Summer only</i>
Woodinville Water Dist.	Variable	2	<i>First tier is up to winter water average</i>
Northshore			
<i>Commercial</i>	Variable	3	<i>Based on meter size</i>
<i>Multi-Family</i>	Fixed	3	
Issaquah	Variable	2	<i>Based on meter size</i>
National Utilities			
Kansas City	Fixed	4	<i>Applies to all customers</i>
Atlanta	Fixed	3	<i>Applies to all customers</i>
Boston	Fixed	6	<i>Applies to all customers</i>
Johnson County	Variable	2	<i>First tier is up to winter water average</i>
Louisville	Fixed	4	
Irving, TX	Fixed	4	<i>First tier is included in base charge</i>

As shown in the table above, the majority of the sampled utilities with tiered rate structures utilize fixed tier sizes within the structure. Conversely, a small proportion of utilities within the survey have a variable block size based on physical characteristics. These physical characteristics include either a customers' service meter size or their consumption characteristics, such as winter water average.

At the present time, SPU has a seasonal rate structure for its general service customer group. A seasonal rate is, in essence, a form of an increasing block rate structure. More technically, it is a time differentiated rate structure. In the survey above, seasonal rate structures are included as a "tiered" rate structure.

Finally, in viewing the survey, care should be taken to consider the differences in the size and circumstances of the utilities. SPU has a large and very diverse customer base for their general service customers. In contrast to this, some of the local utilities surveyed are primarily residential-based suburban systems and do not have a large base of general service customers with wide variations in use. In other words, on some systems, the general service customer usage profiles are not that dissimilar to a residential customer.

Review of a Tiered Rate Structure for General Service Customers

In general, tiered rate structures are considered to be well-suited for residential customers given that consumption patterns for the entire group of residential customer are fairly homogeneous and, in general, relatively predictable. In contrast to the residential customer group, the development of a tiered water rate structure for general service customers may not be as appropriate or as clear of a fit. First, it can be difficult to develop appropriate tier sizes given the wide range or variation of consumption characteristics within the class. These can vary from a small convenience store using a few thousands of gallons a month to a large hotel or office building using thousands of gallons a day. As one can imagine, the total usage and consumption patterns for these customers are very different. As noted in the AWWA M1 Manual:

*"Increasing block rates are not a one-sized-fits-all solution. Unless used with a small, highly homogeneous customer base, system-wide application of a single increasing block rate structure is likely to result in cost-of-service inequities, especially to commercial and industrial customers with relatively uniform consumption patterns (low peak demands but high total usage)."*²

As mentioned in the AWWA M1 Manual, these large use customers may have significantly more use, but at the same time, may be an efficient user (low peaking factor). If that is the case, the capacity impact to the system is different than the impact of a residential customer. As noted previously, a tiered rate structure typically following the impacts of high peaking factors on the system, and a high user with a low peaking factor is not being equitably charged under a tiered rate structure; particularly a tiered rate structure with inappropriate tier sizes for general service

² AWWA M1 Manual, Principles of Water Rates, Fees, and Charges, 6th edition, Page 112

and using punitive pricing more reflective of “wasteful” residential outdoor usage. To reinforce this observation and comment, the AWWA M1 Manual also states:

“Customer classes that do not demonstrate uniform demand patterns might be adversely impacted by an increasing block structure.”³

This is also further noted in the AWWA M1 Manual when developing the blocks by customer class that:

“Increasing block rates should usually be designed by customer classes (i.e., groups with similar usage patterns).”⁴

Given SPU’s heterogeneous nature of the general service customer class, a tiered rate structure may not reflect the cost of service results and result in larger bill impacts (i.e., inequity) to customers simply because they use more water, which is not likely reflective of their cost impact to the system.

The use of simple fixed tier sizes for general service does not appear to be reasonable or appropriate for SPU given the diverse mix of general service customers on SPU’s system. One approach that is sometimes used to address these differences is the development of tiers by meter size. Under this approach, each meter size has a different set of tiers. This method was used by two of the sampled utilities. With regard this approach, the AWWA M1 Manual, states the following:

“This rate structure is best applied to customer classes that demonstrate a significant peaking pattern and might not be appropriate for industrial or commercial customers that use water at relatively consistent levels throughout the year.”⁵

Again, the critical component is the customer group having similar consumption characteristics, primarily related to the peaking on the system and overall consumptive use. In the experience of HDR, larger meters do not always translate to larger average use. For example, a set of customers served by 2” meters may have an average monthly usage which is greater than customers served by 6” meters. There typically is not a direct correlation between meter size and the average use of the customer group. Lacking a clear correlation, the use of this method has certain technical and equity flaws

Finally, the primary purpose of a tiered rate structure, when designed properly and based on cost of service principles, is to provide a price signal and encourage conservation. As noted, the sizing of the blocks is typically based on the average use of the customer group for indoor use and outdoor use, or average monthly use. Given this, the development of a tiered rate structure for general service customers may be problematic as it is difficult to discern, as a single class, what is “indoor use” and what is “outdoor irrigation use”, the latter being the target area of a tiered rate structure. Even average class usage is problematic given the heterogeneous nature of the

³ Ibid, Page 114

⁴ Ibid, Page 111

⁵ Ibid, Page 115

general service customer group as a whole. As noted, if not developed properly, the rate structure may be inequitable to customers.

Summary and Conclusions

The basis for a tiered rate structure is a homogeneous customer class that allows for the development of tier sizes and pricing that reflects the cost of providing water service. While a tiered rate structure can be appropriate for a residential customer group, given the homogenous consumption patterns, the heterogeneous nature of the general service class makes it difficult to maintain an equitable rate (bill) for the various types of general service customers.

In HDR's experience, a tiered rate structure for a general service customer group does not maintain equity given the need to establish tier sizes for customers with a wide ranging level of consumption. This is further impacted by large users whose use is constant over the course of a month or year and don't place peak demands on the system. Furthermore, HDR has direct experience in situations where tier sizes by meter size result in inequities as a result of no direct correlation between meter size and usage.

Given the above discussion, HDR would recommend maintaining a seasonal rate structure for the general service customer group. The seasonal rate structure maintains a conservation price signal, is much simpler for the customer to understand, easier for SPU to administer, and in the end, it is a more equitable and cost-based approach for the general service customers.